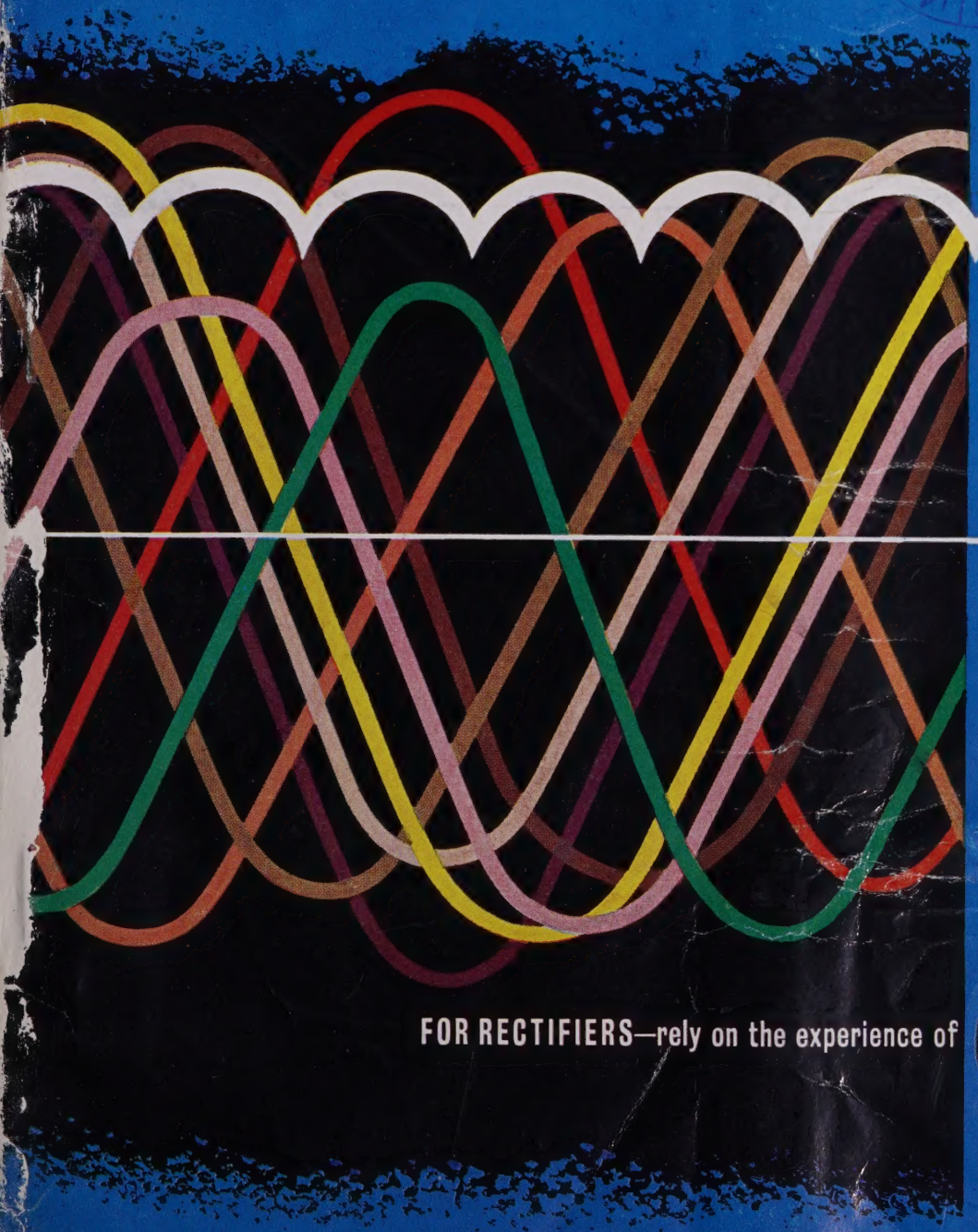
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FRIDAY
29 SEPTEMBER 1961

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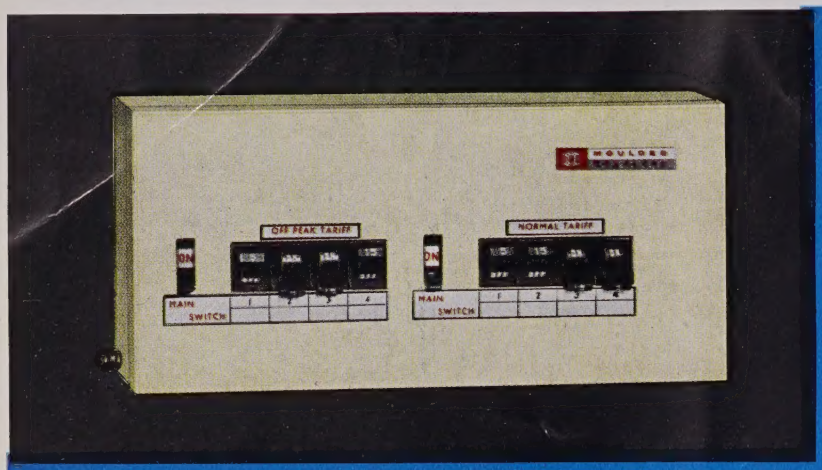


FOR RECTIFIERS—rely on the experience of G.E.C.

The General Electric Company Limited of England
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Immediate deliveries — Competitive prices

Install THE Stab-lok CONSUMERS' SERVICE UNIT

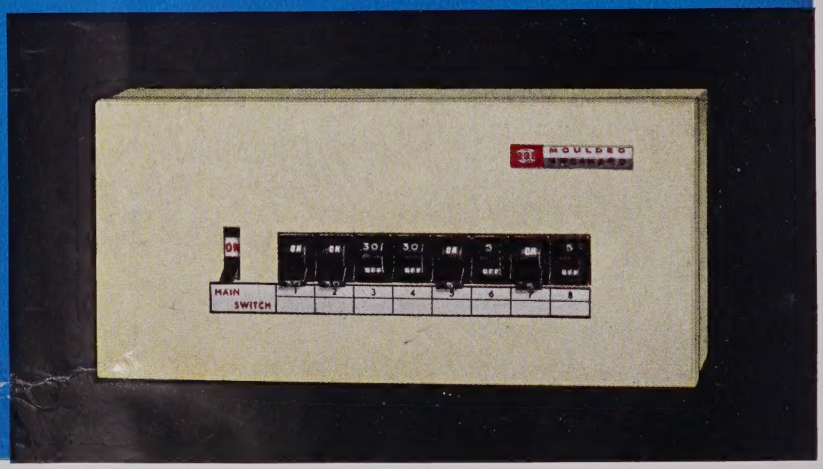


Stab-lok Circuit Breakers, the most proven Circuit Breaker, have now been incorporated into a range of Domestic Consumer Units. These Units form a comprehensive range from 4 to 12 ways for use on single tariff and 4 to 8 ways for use where two part tariff control is required.

The Units are enclosed in sheet steel enclosure protected and finished by an undercoat and top coat of neutral shade stoved enamel. The Units are complete with busbars of 60 amperes capacity, 60 ampere double pole slow make, slow break isolating switches, neutral and earthing busbars.

The Units can be mounted surface or flush and have facilities for conduit entry or back entry of cables.

All Consumer Units will accommodate Stab-lok Circuit Breakers with ratings of 5, 15, 20, 25, 30, 40, 50 and 60 amperes.



RANGE

Catalogue No.	Description	Length	Height	FLUSH Pattern
FOR STANDARD TARIFF			Overall height of boards 7" Overall depth 2¾" plus ⅝" projection for circuit breaker handles	For Flush boards add 1¼" to length and height
DU. 4	4 way S.P. & N.	8¾"		
DU. 8	6 & 8 way S.P. & N.	15¼"		
DU. 12	10 & 12 way S.P. & N.	19¾"		
FOR TWO PART TARIFF				
DU. 4/4	4/4 way S.P. & N. (8 breakers)	15¼"		
DU. 4/8	4/8 way S.P. & N. (12 breakers)	19¾"		

British made to British requirements

E.C.C. (MOULDED BREAKERS) LIMITED

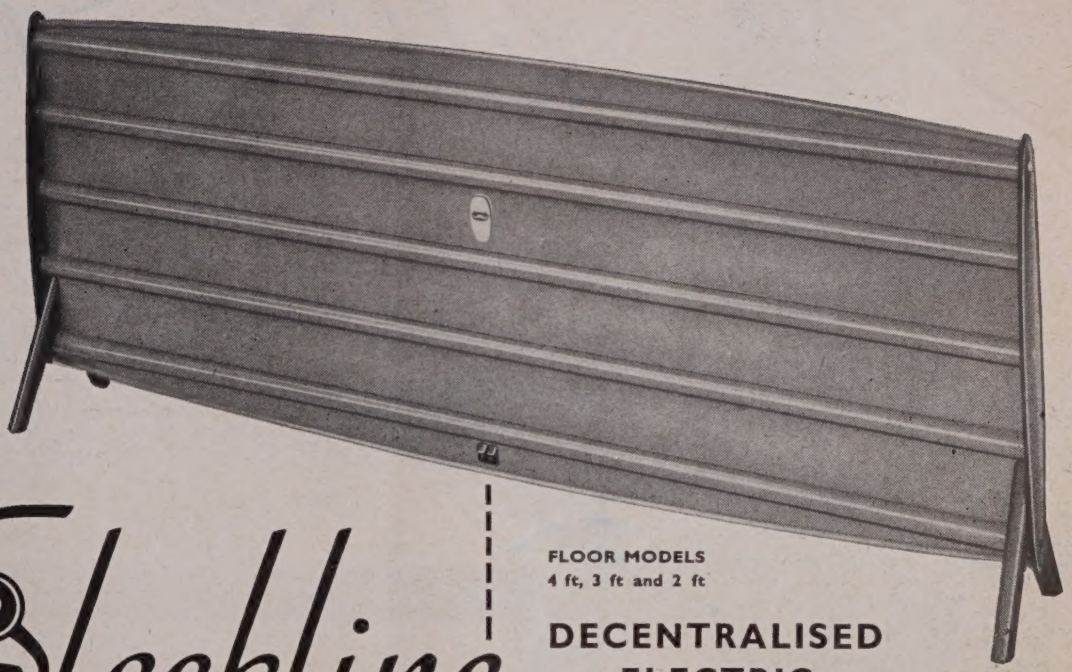
FORDHOUSE ROAD WORKS WOLVERHAMPTON

E.C.C. (MOULDED BREAKERS) LTD. Publicity Dept., Wolverhampton Publication MB/CUL10561

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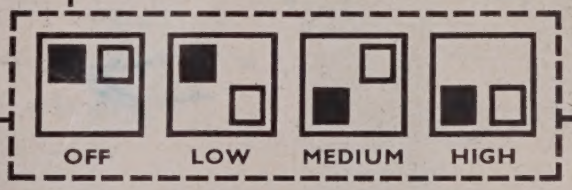


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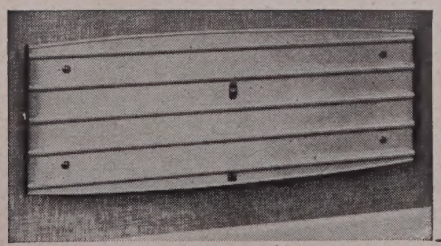
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4 ft, 3 ft and 2 ft

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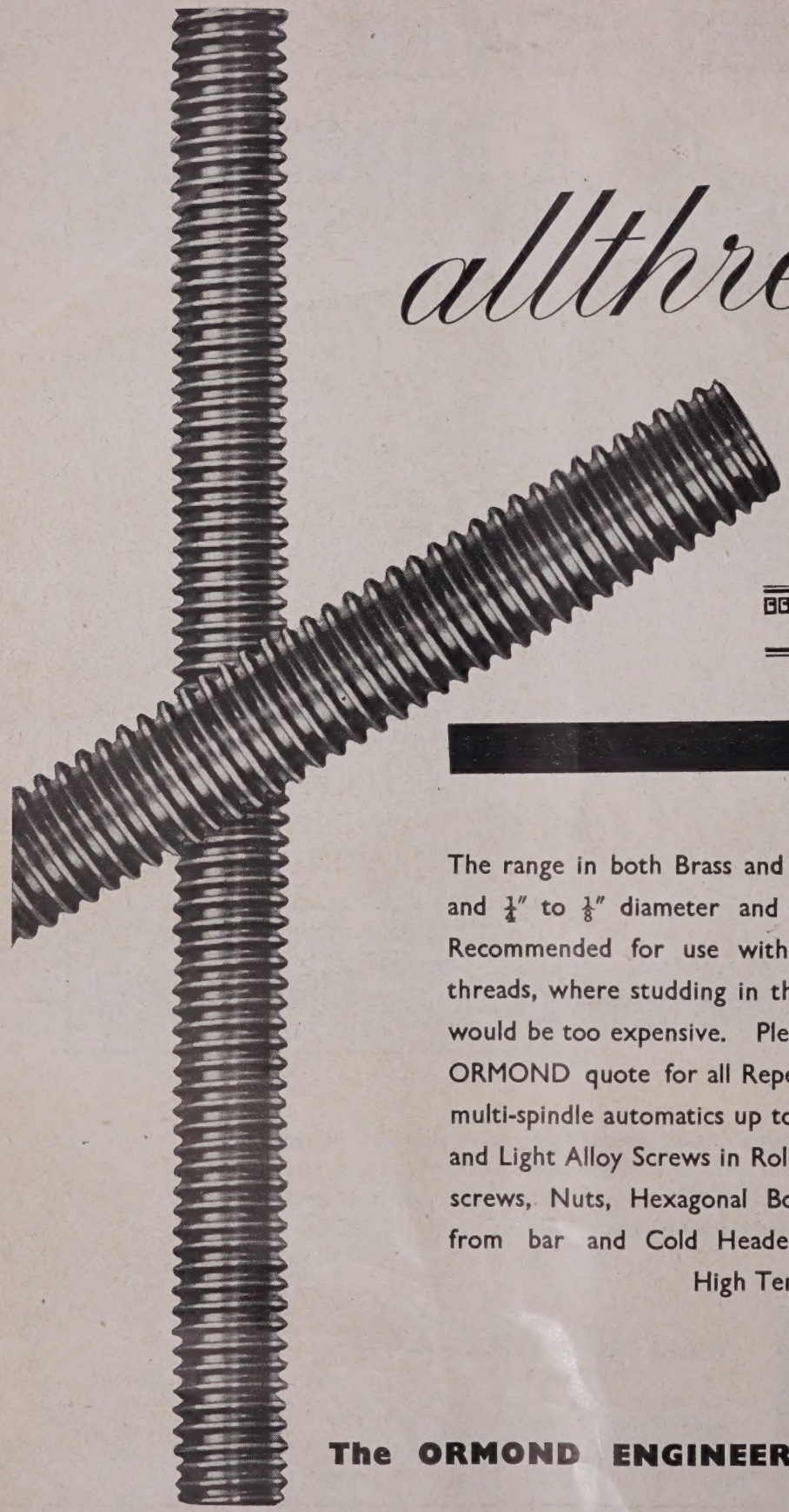
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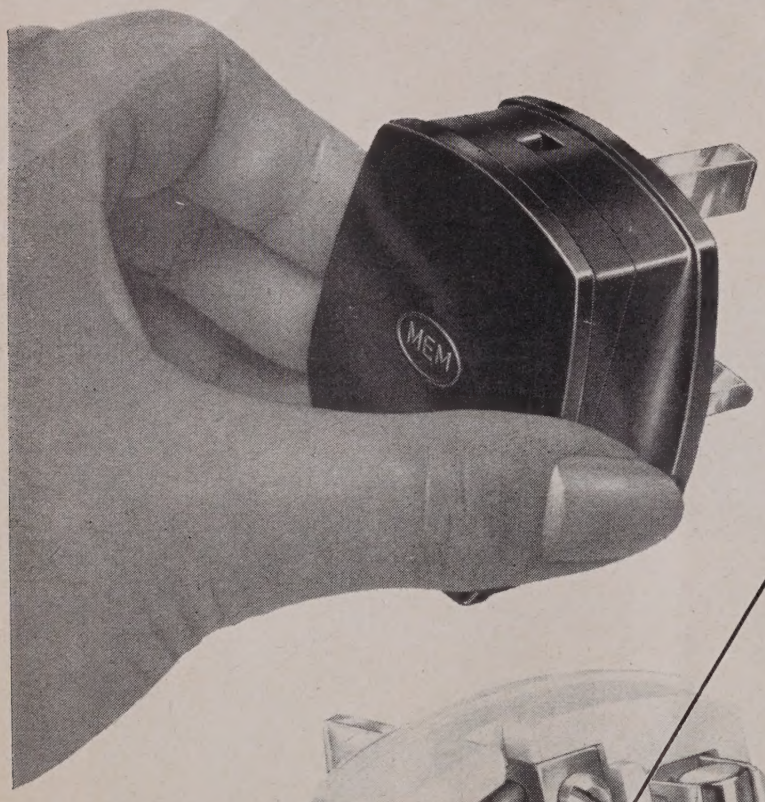
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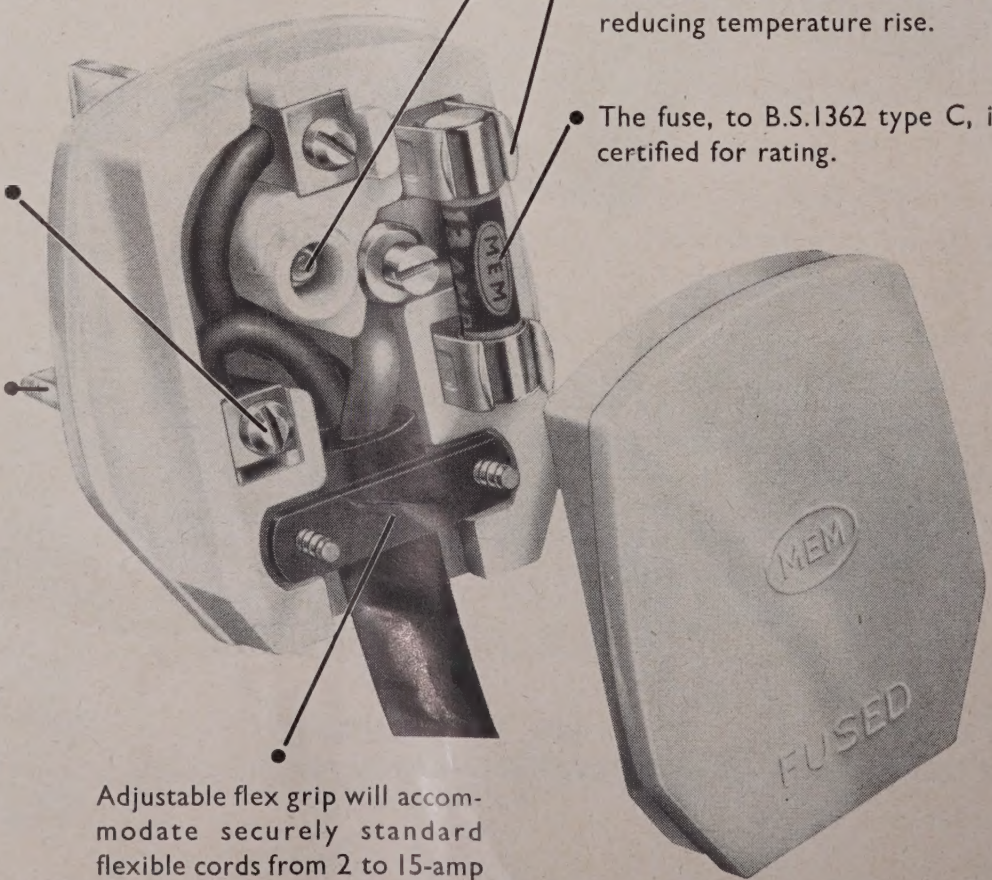
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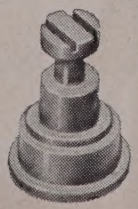
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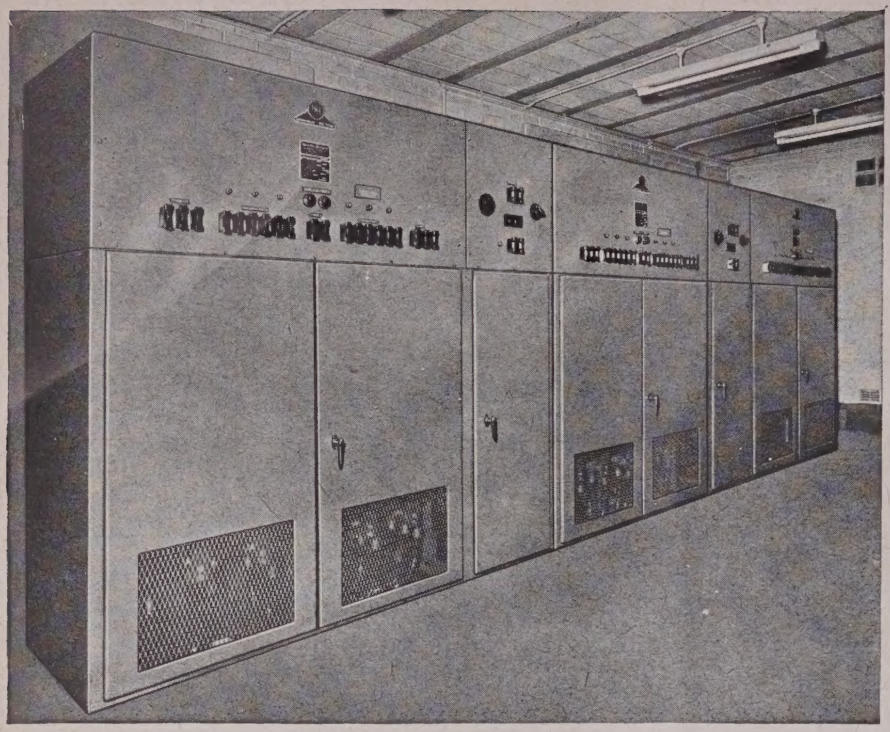


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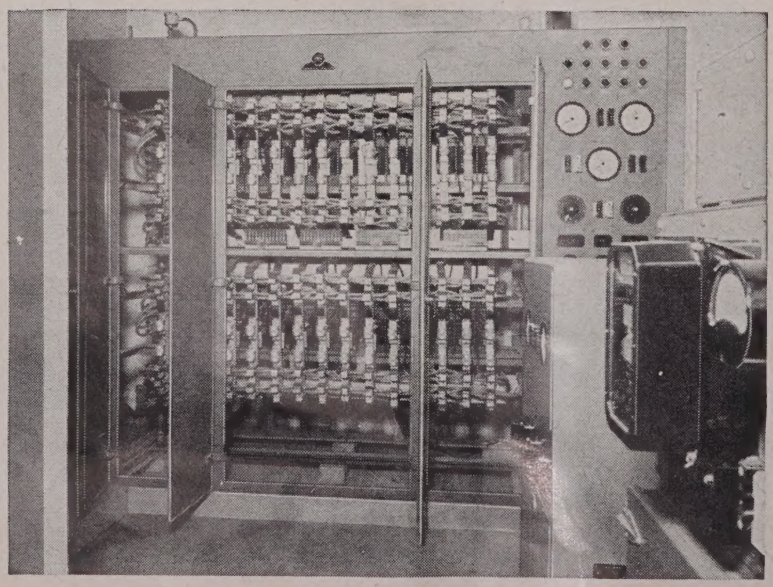
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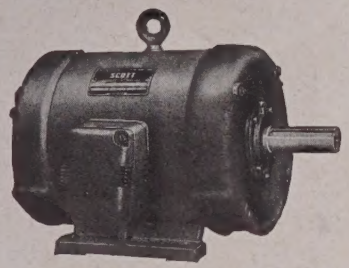
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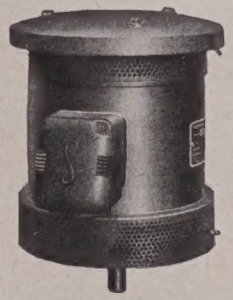
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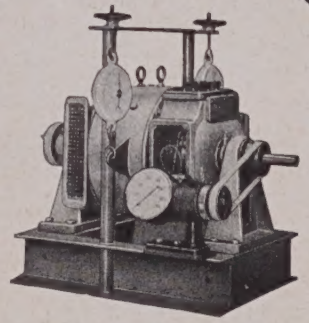
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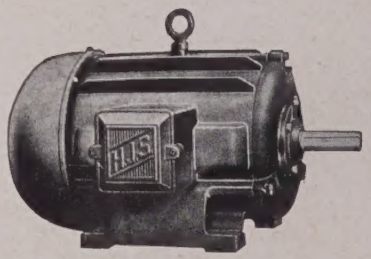
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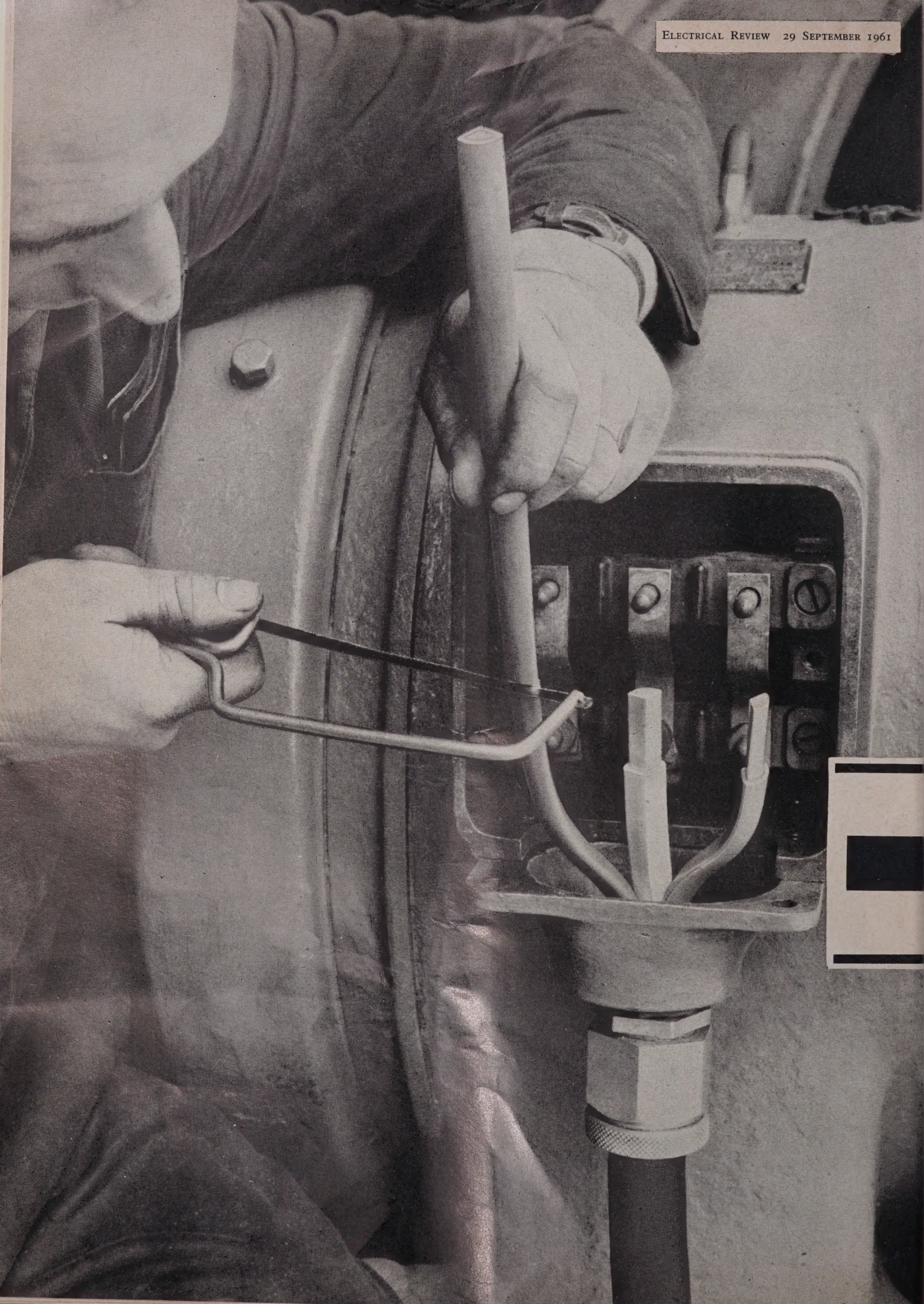


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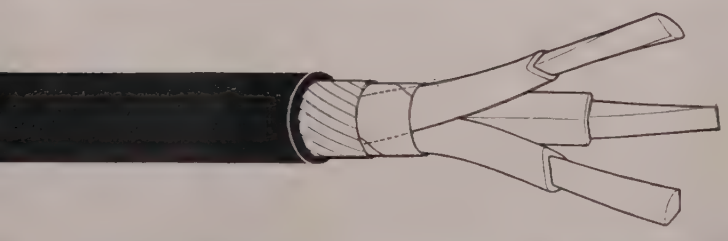
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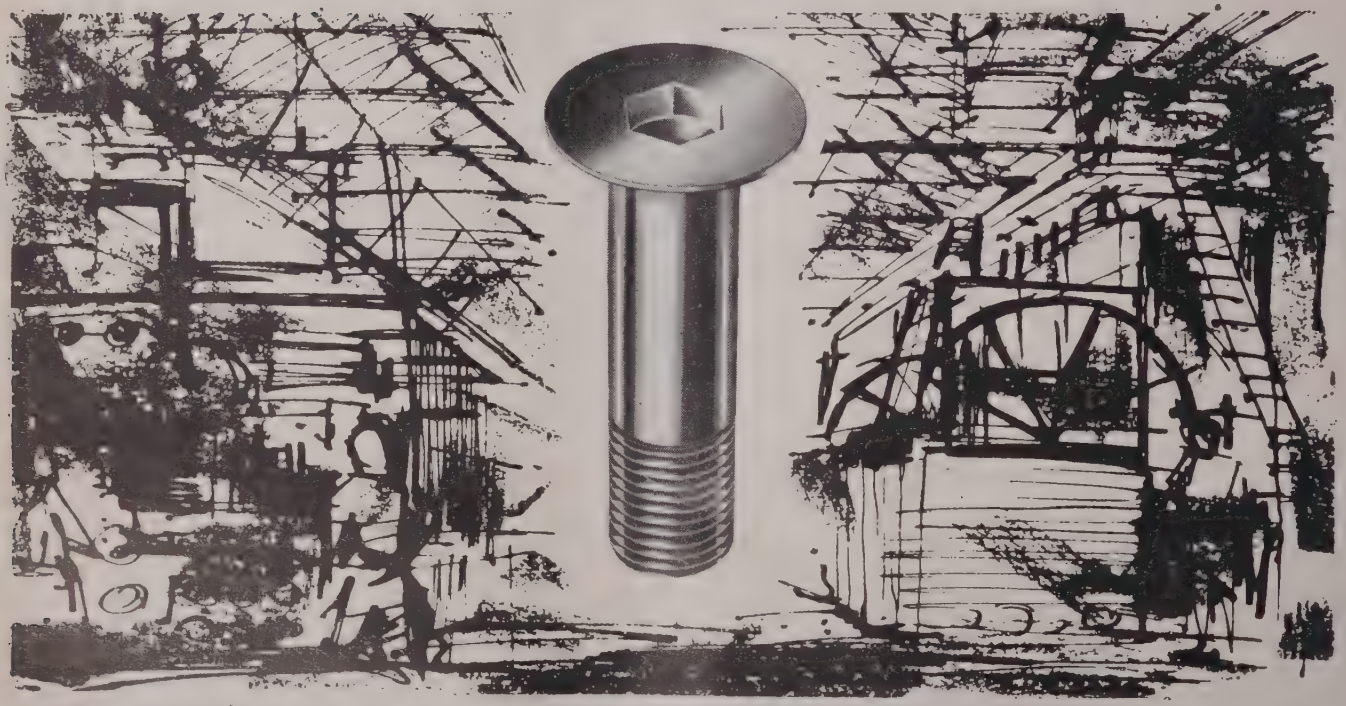
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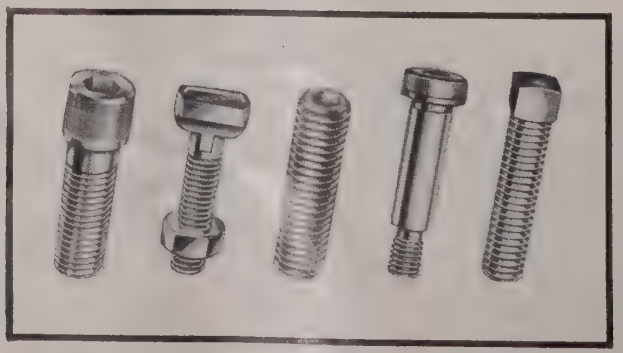
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That dimension is in-built performance. A basic characteristic of Unbrako screws which is proved by a negative. The fact that Unbrako screws do NOT fail industry even when subjected to the most prolonged of gruelling conditions.

Reliability stems from research. No screw in the whole wide world is backed by more research than Unbrako.





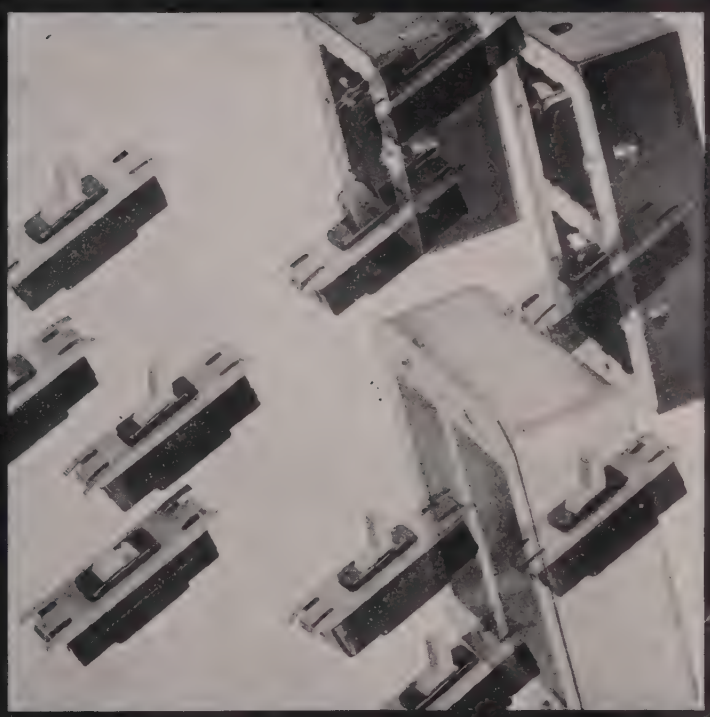
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5 amp 1 way S.P.
15 amp 1 way S.P.
5 amp 1 way D.P.
5 amp 2 way S.P.
5 amp 2 way & off
5 amp intermediate
5 amp 1 way secret
5 amp 2 way secret
Bell Push
Neon Indicator
Blanking Unit

'Mutac Clipper' switches cost no more than ordinary switches to buy and far less to install—that's a result of G.E.C.'s *new approach.* Complete interchangeability of 'Mutac Clipper' enables you to standardise right through a job.

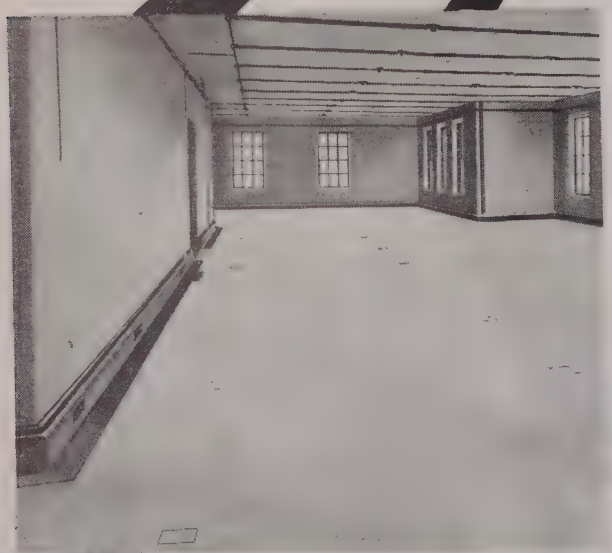
that's the New Approach of G.E.C.

INSTALLATION EQUIPMENT GROUP

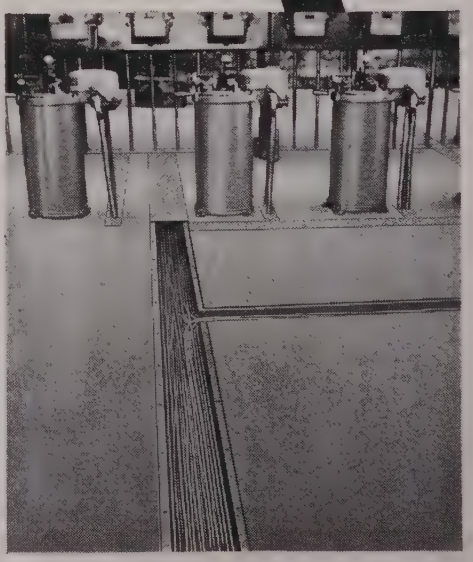
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so versatile it could have been designed for the building



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Power Centre products include:

All forms of cable trunking
Busbar Trunking
Rising Mains
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PC

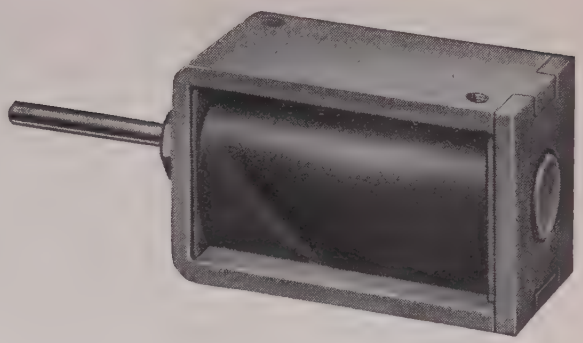
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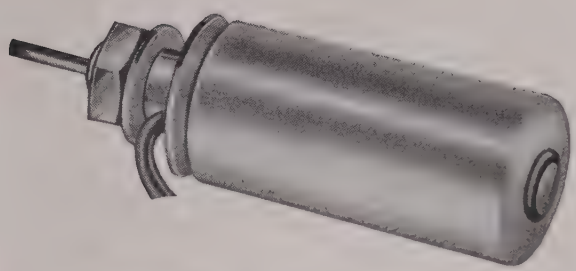
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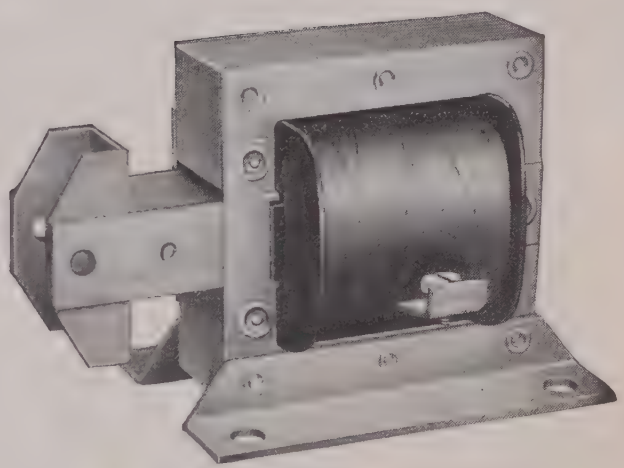
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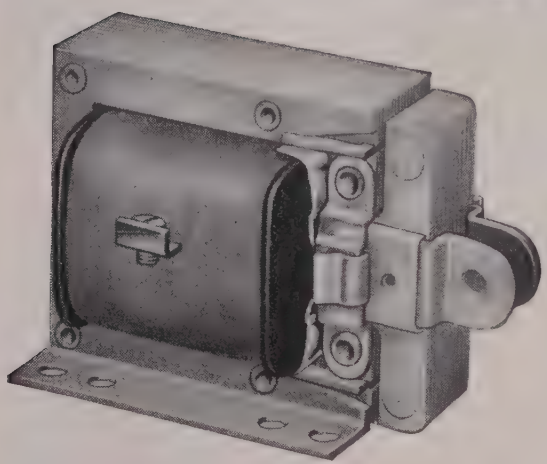
The Power Centre Co. Ltd, P.O. Box 18, Lloyd St, Wednesbury, Staffs.

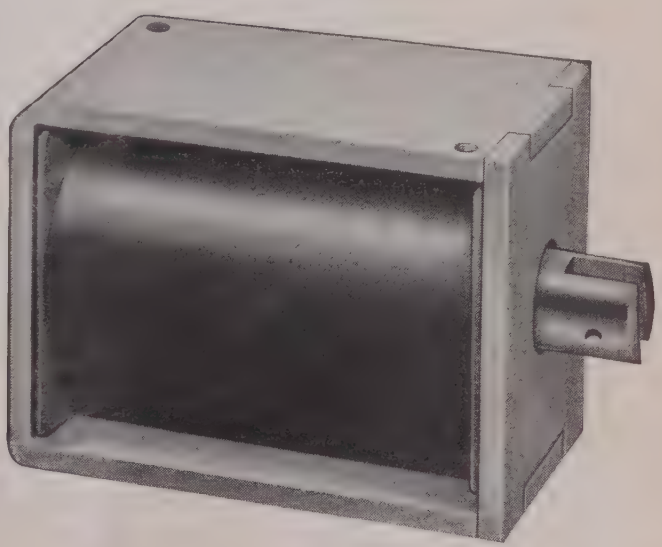
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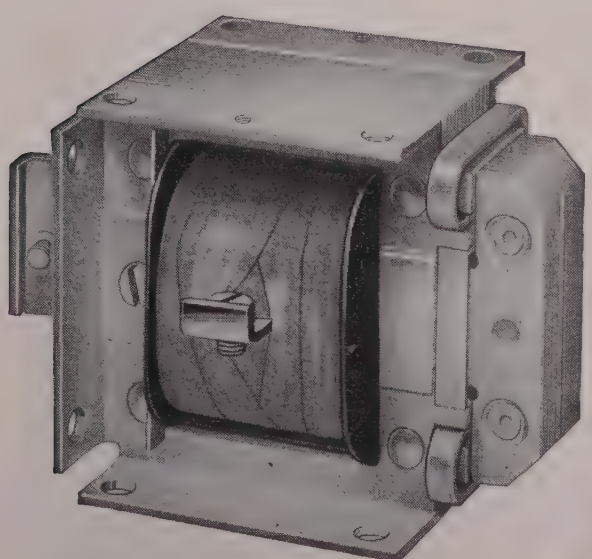












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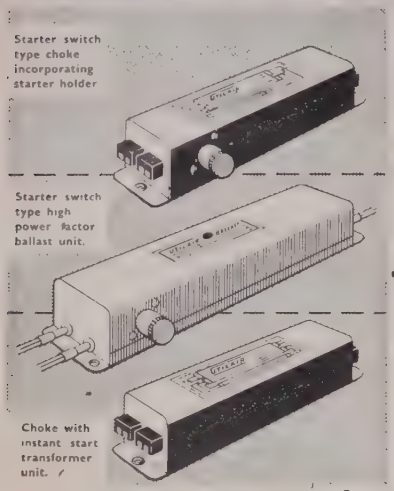
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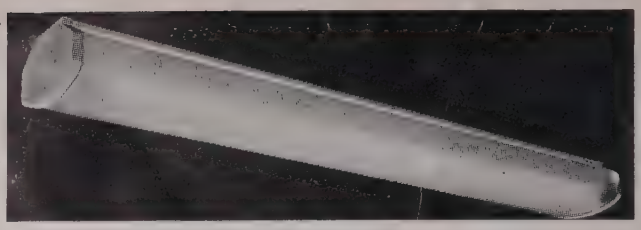
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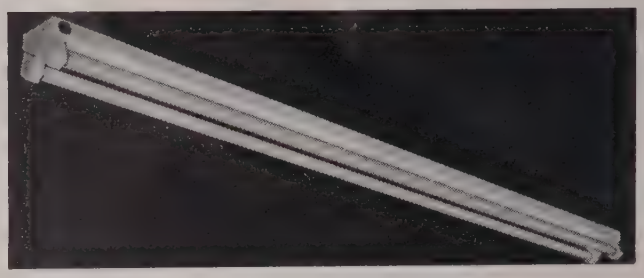
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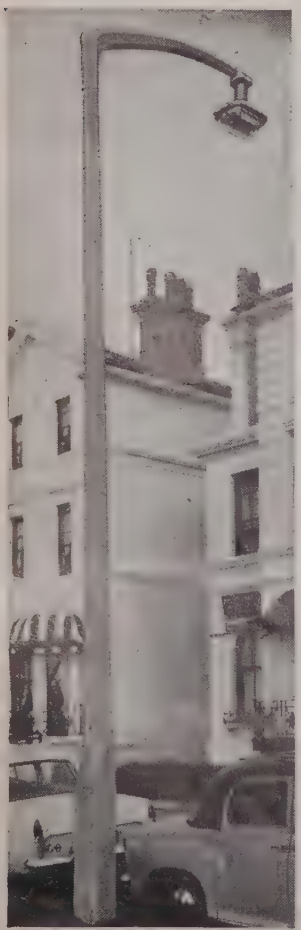
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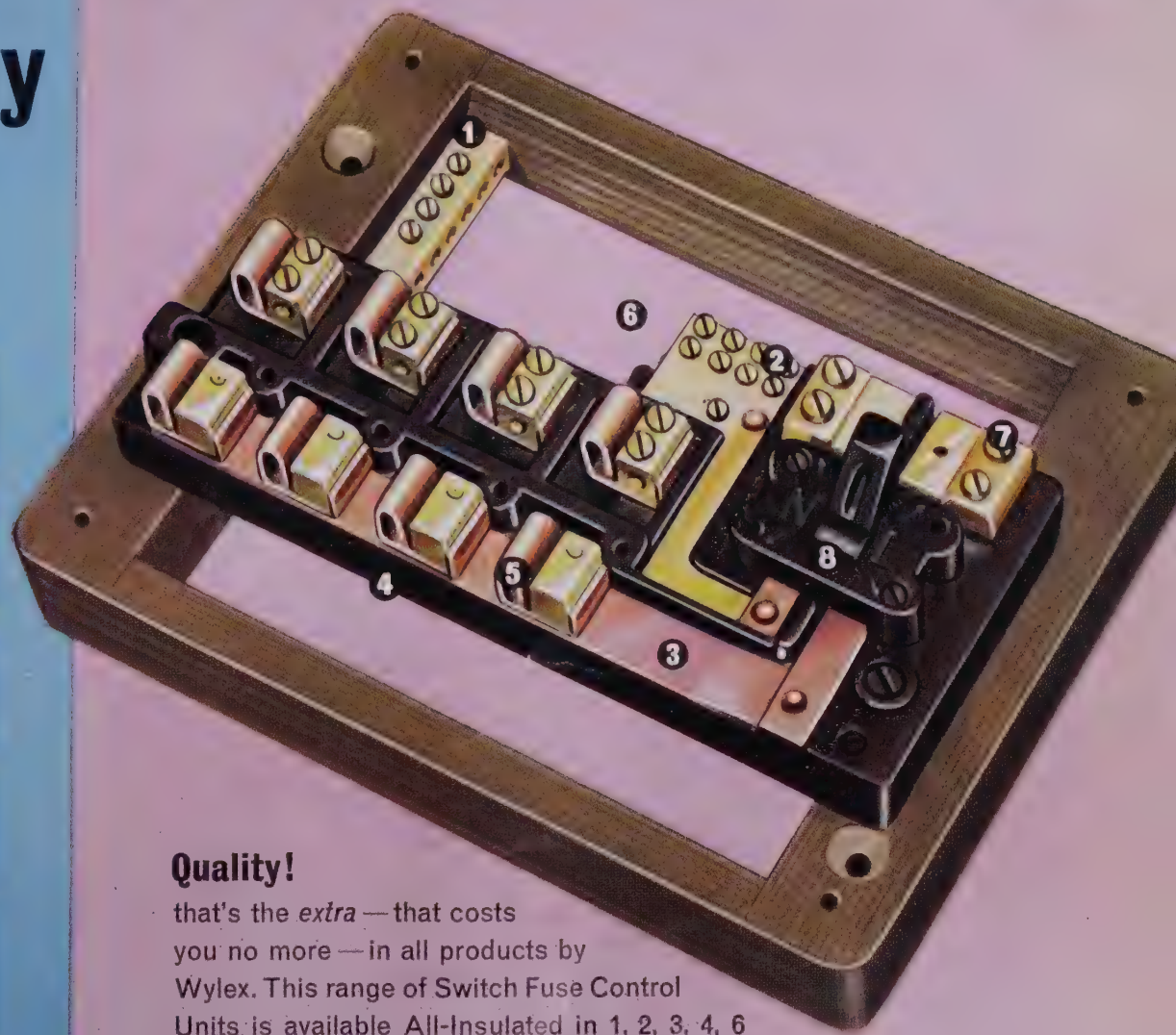
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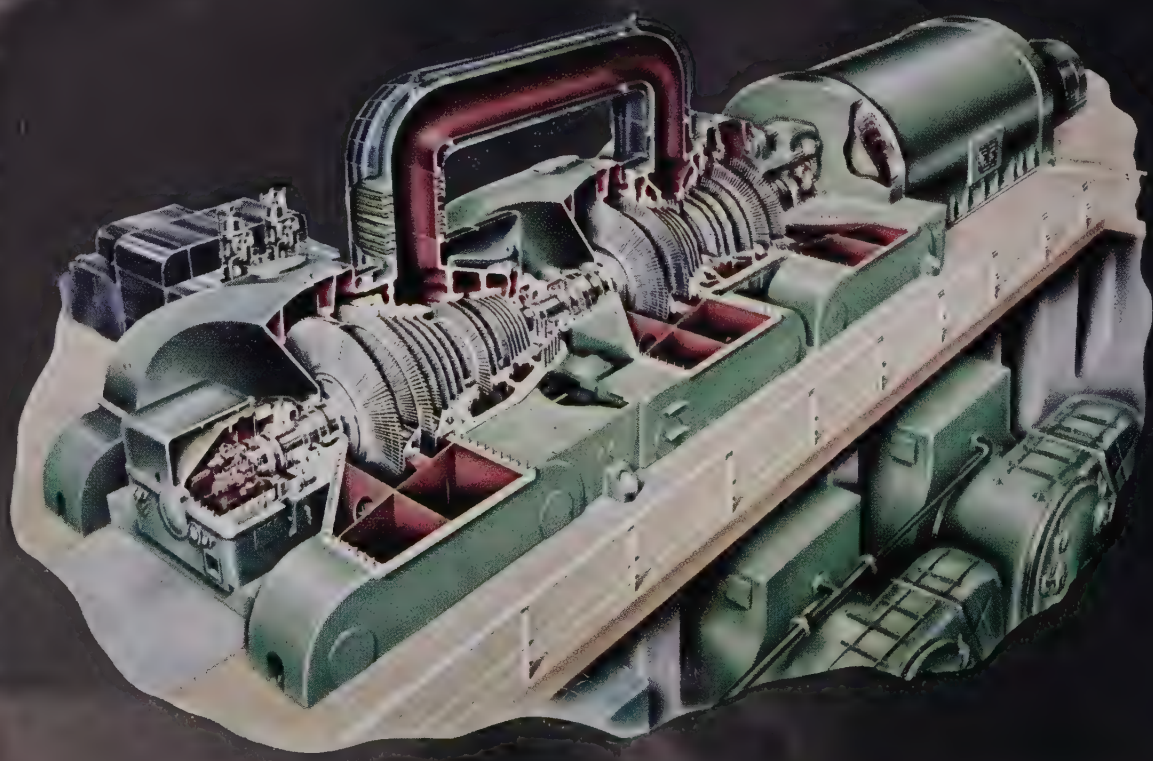
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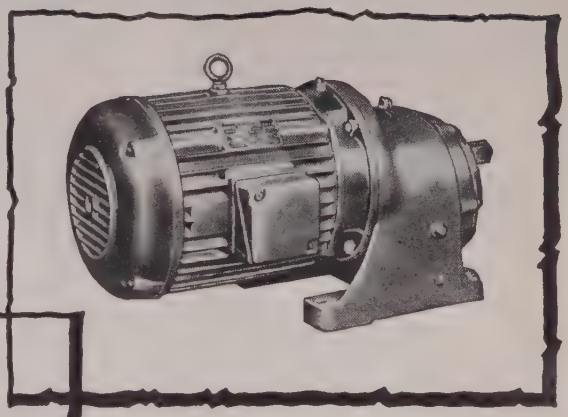
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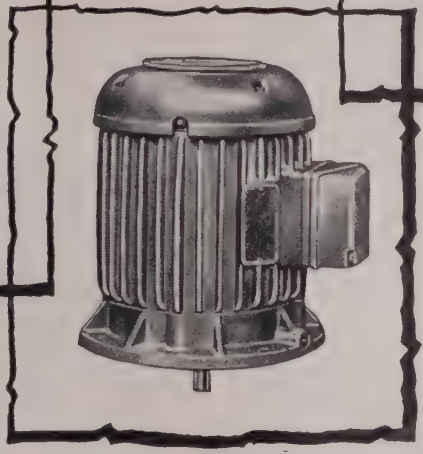
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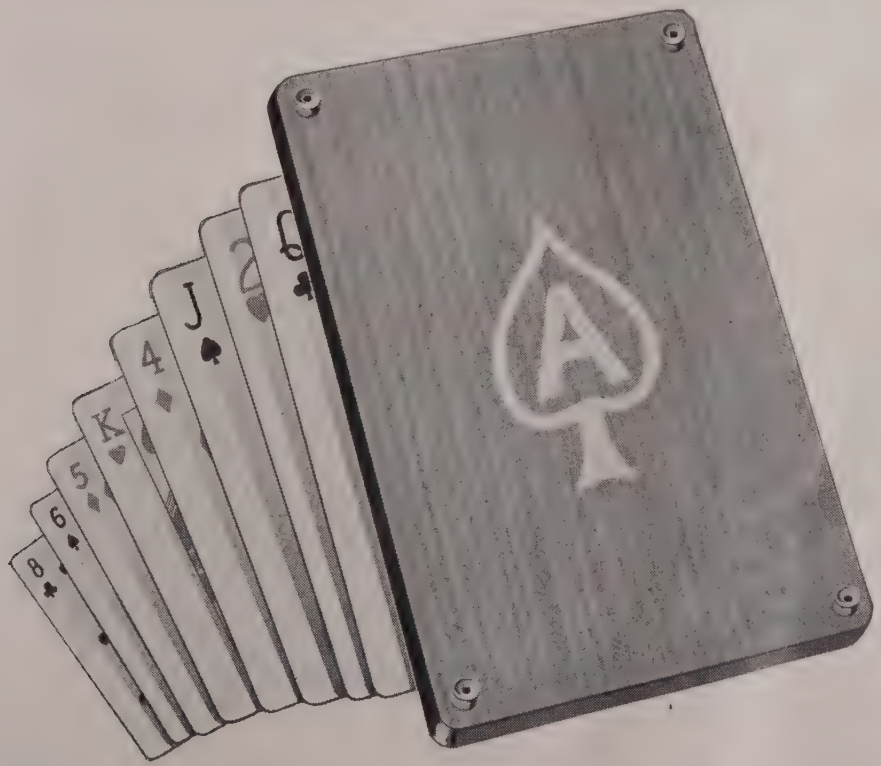


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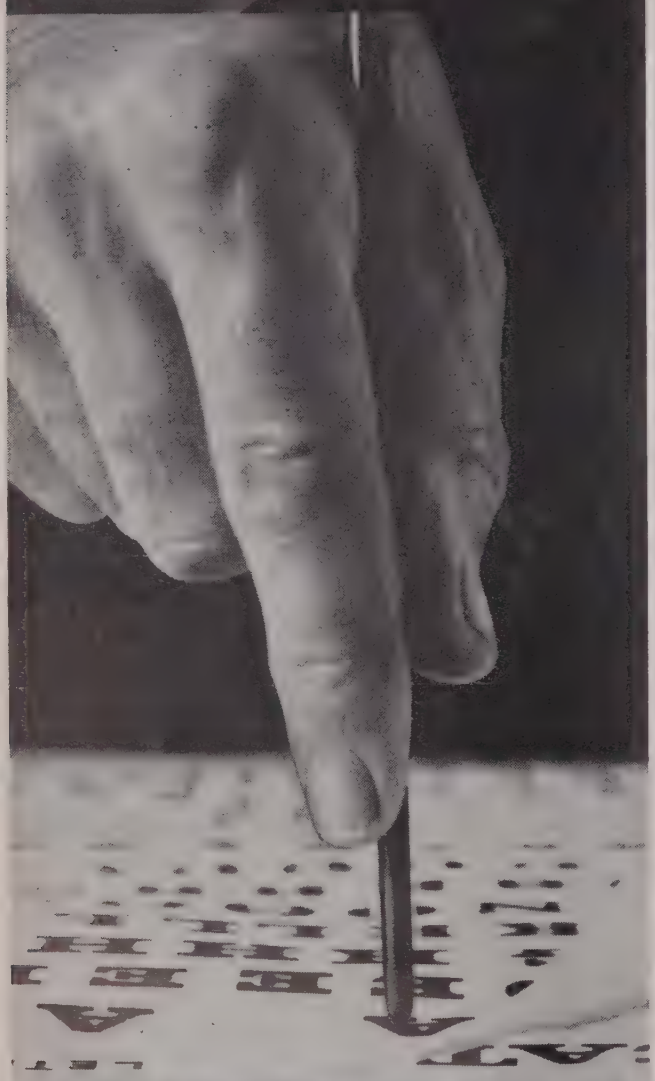
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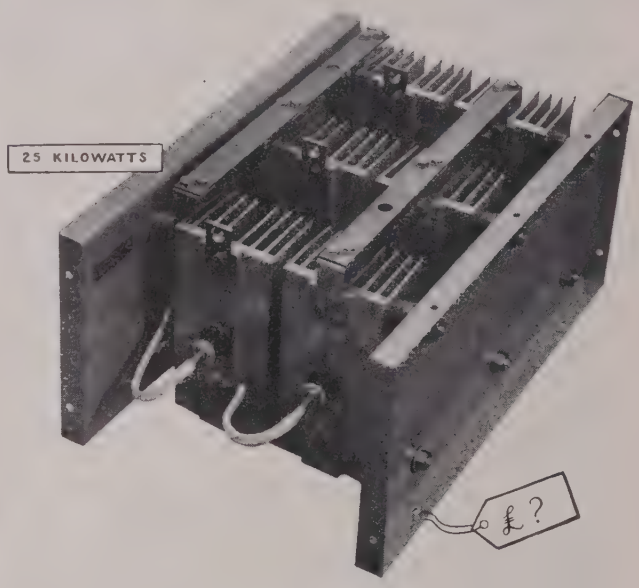
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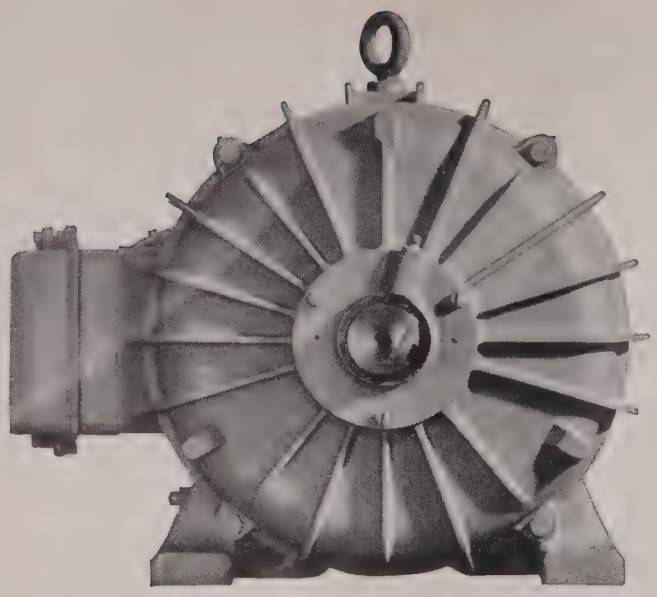
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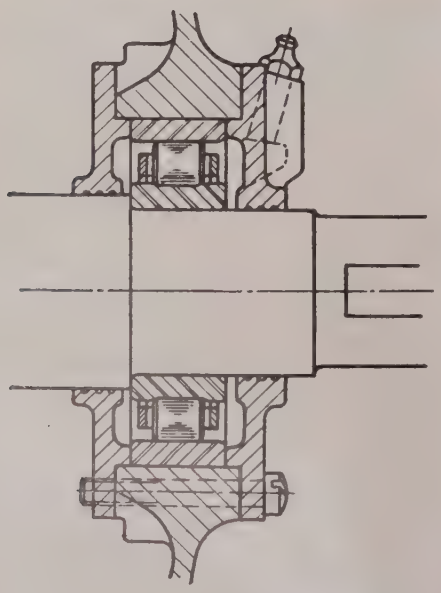
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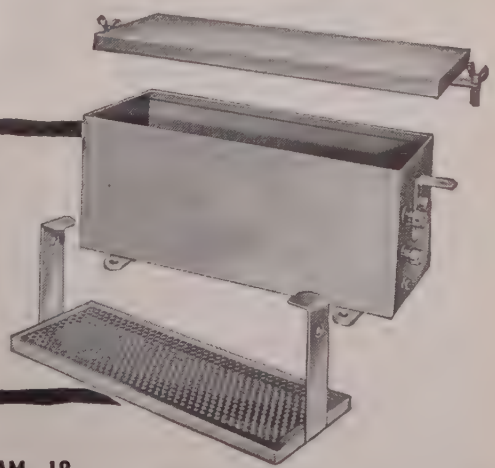
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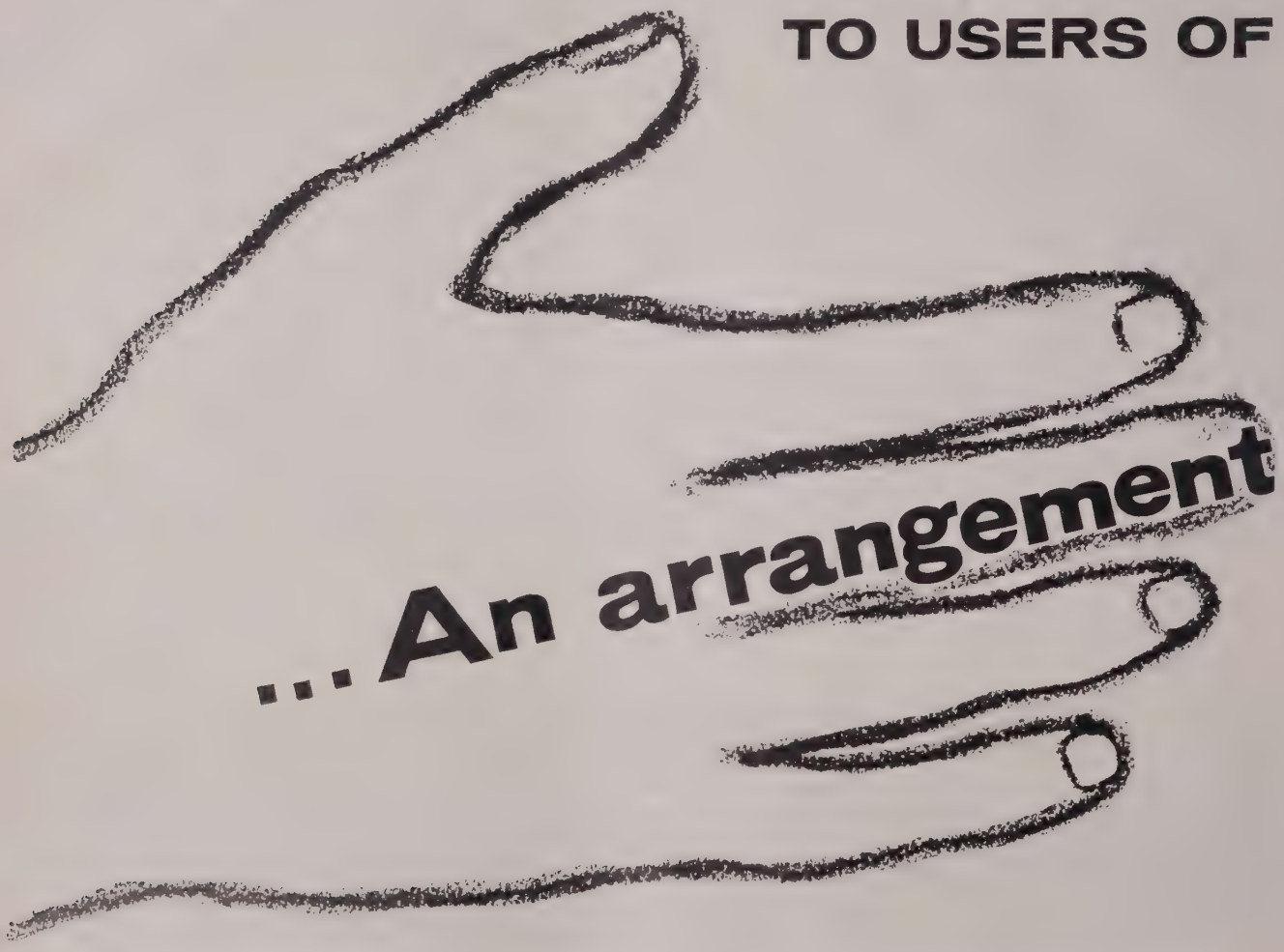
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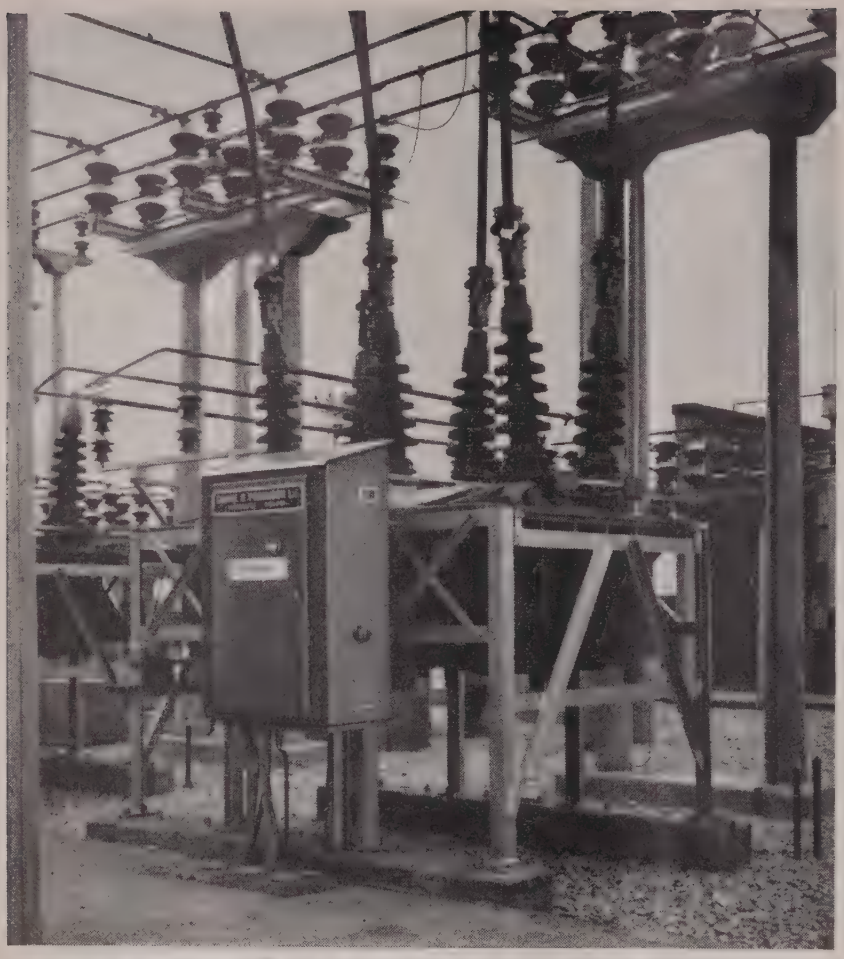
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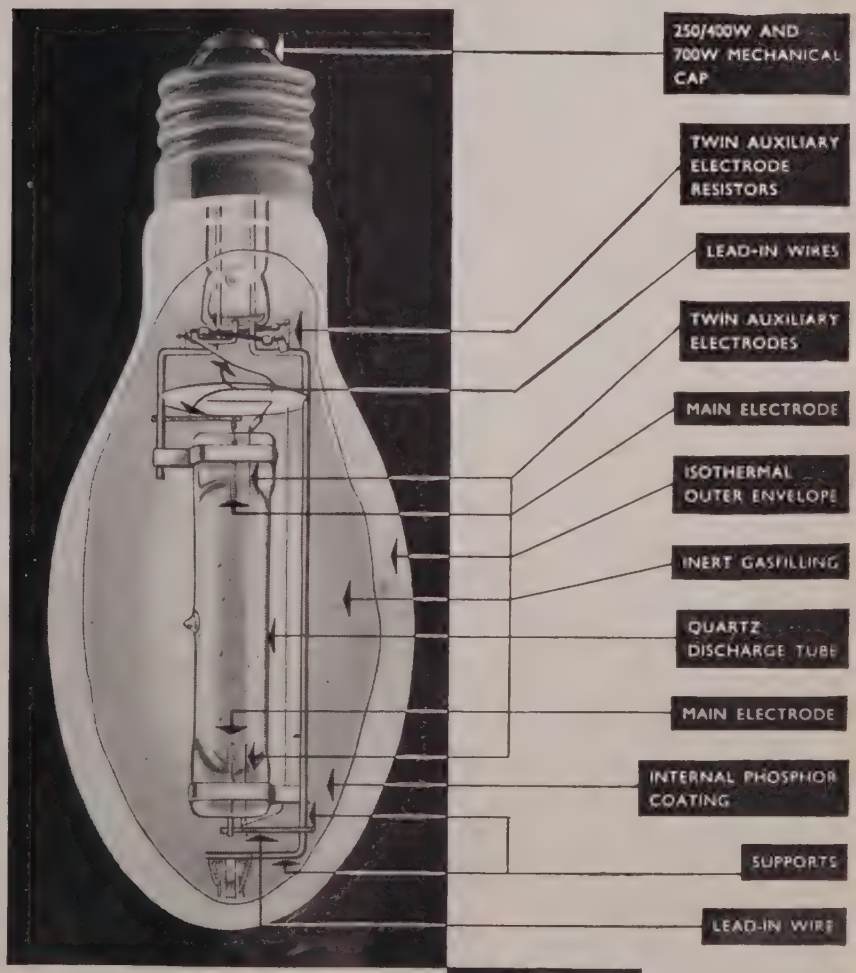
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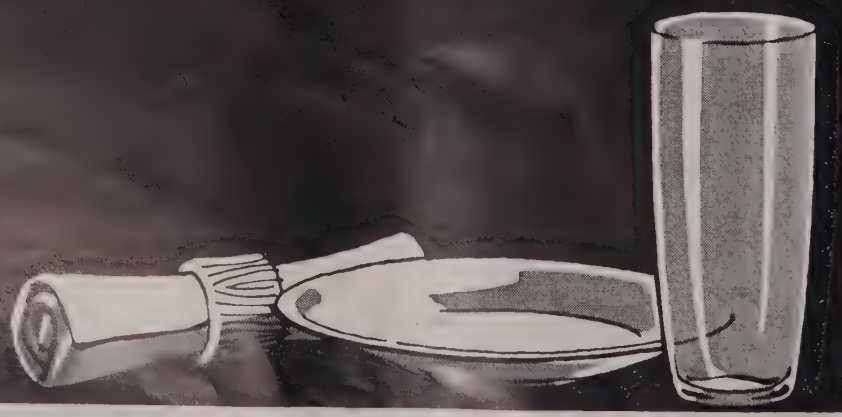
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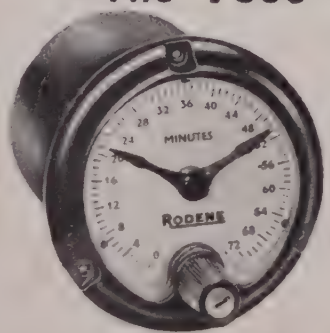
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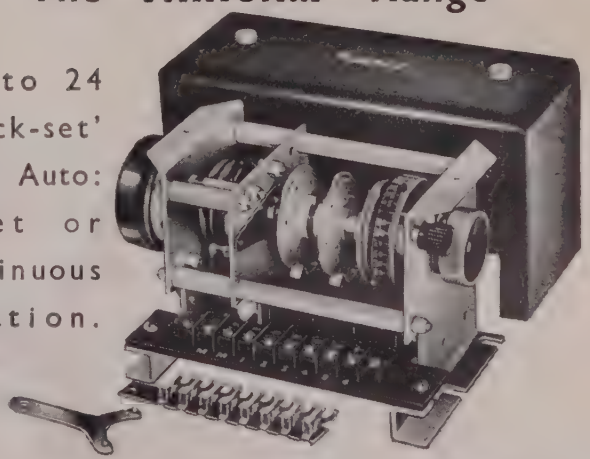
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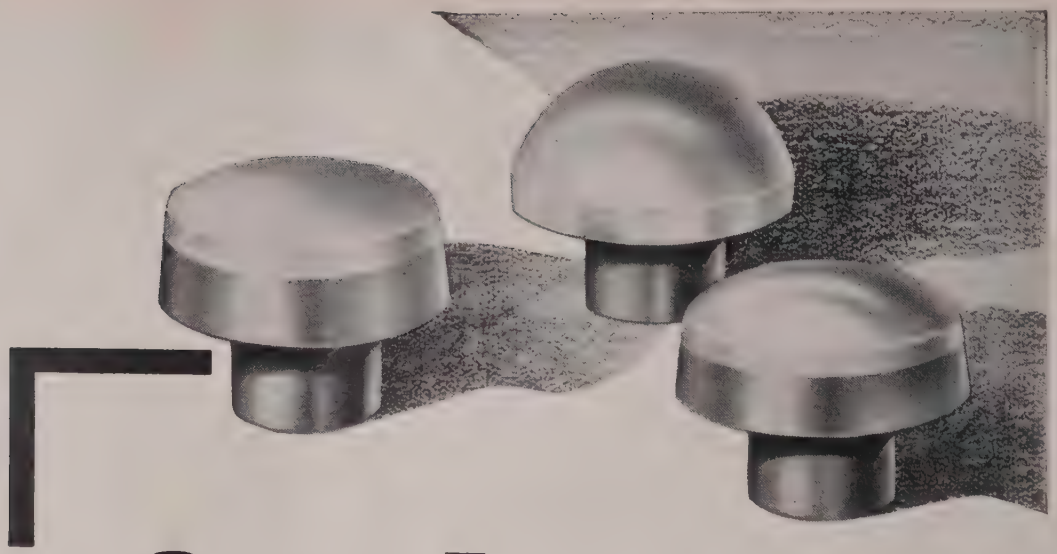
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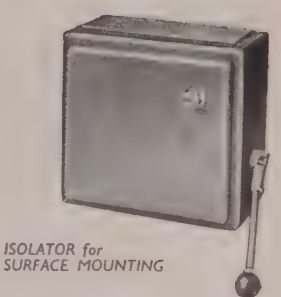
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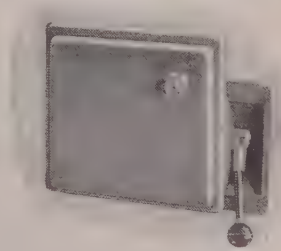


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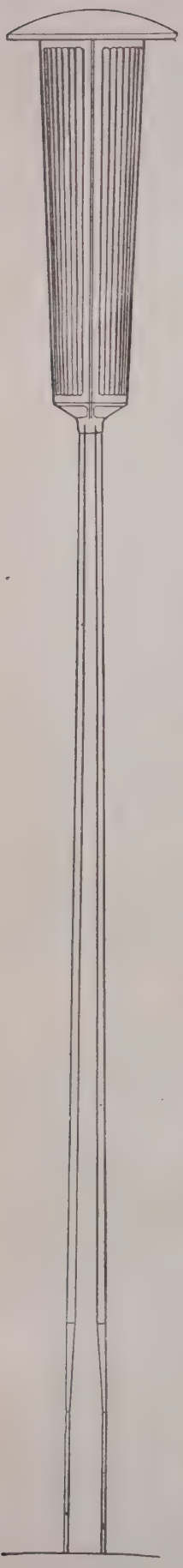


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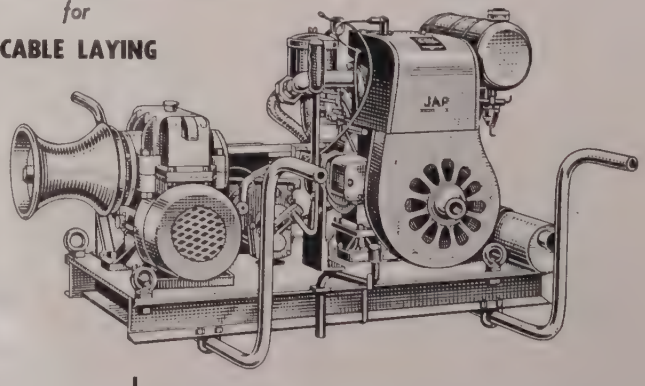
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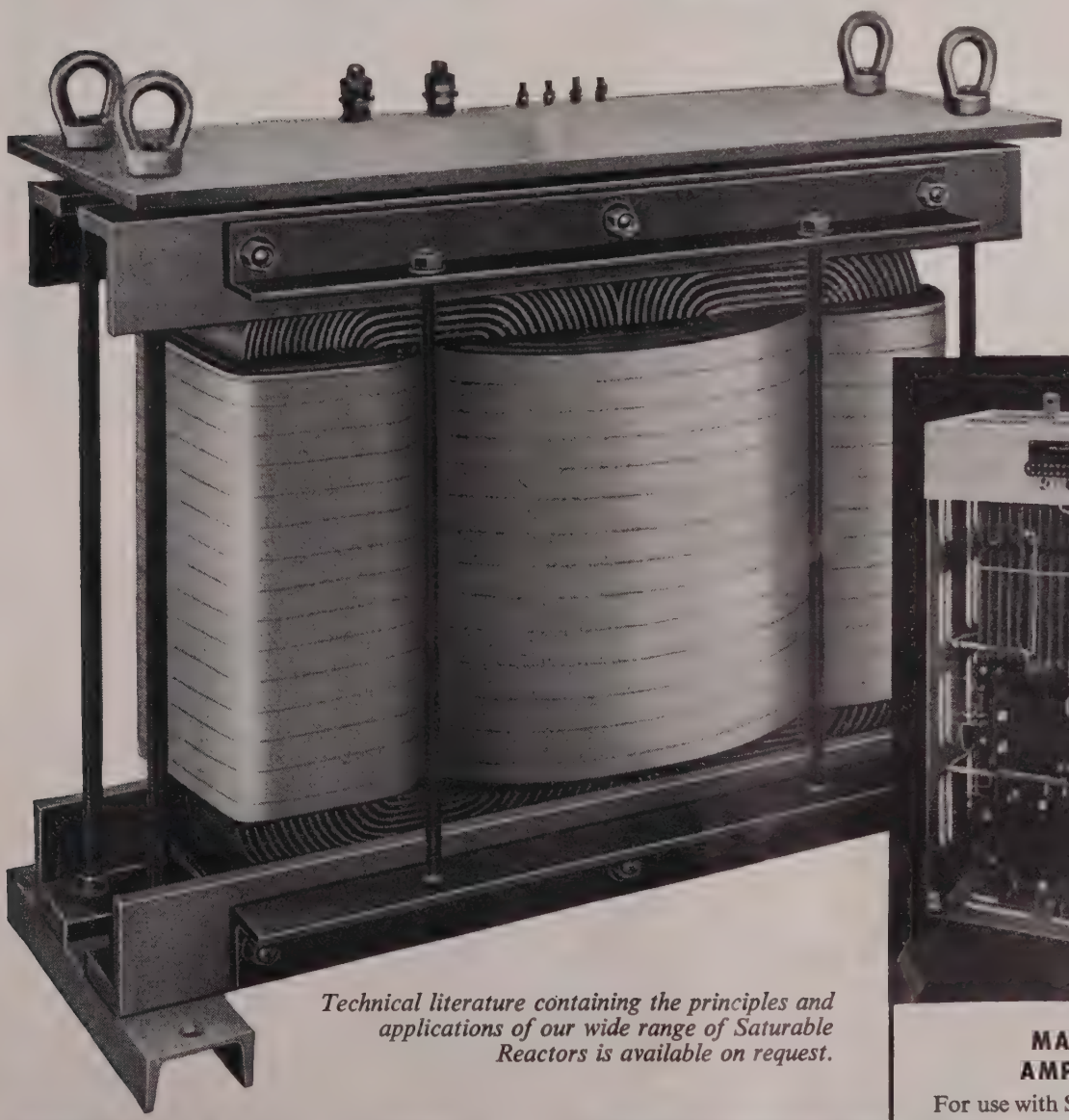
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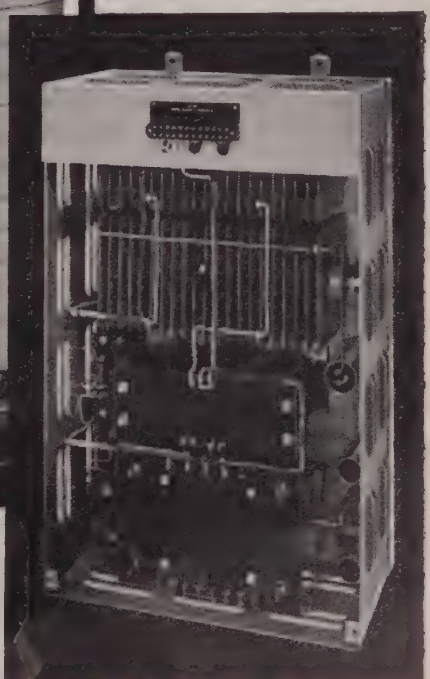
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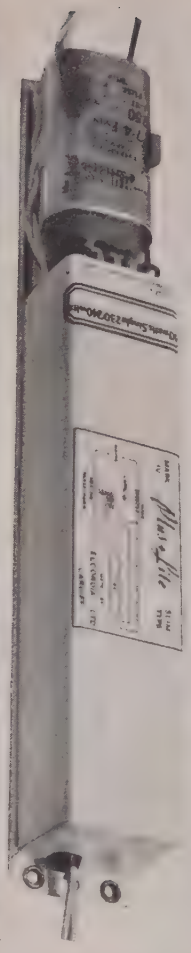
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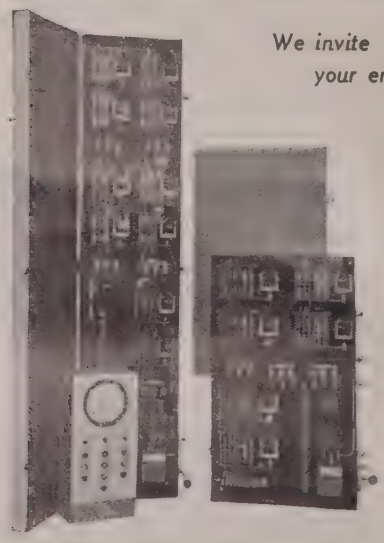
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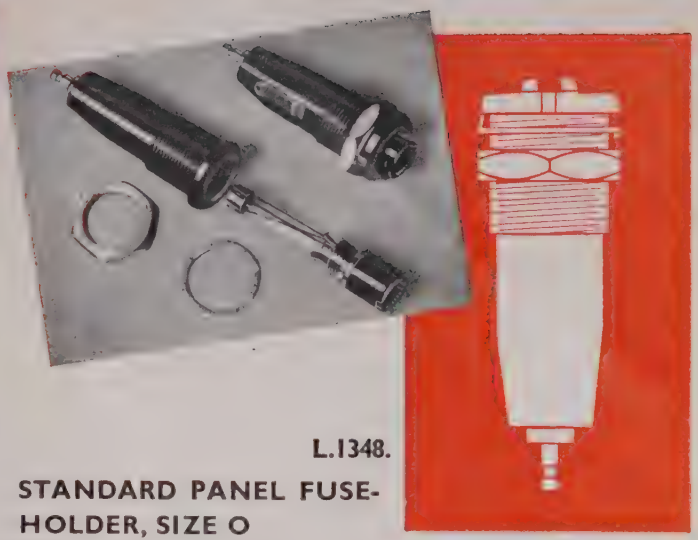
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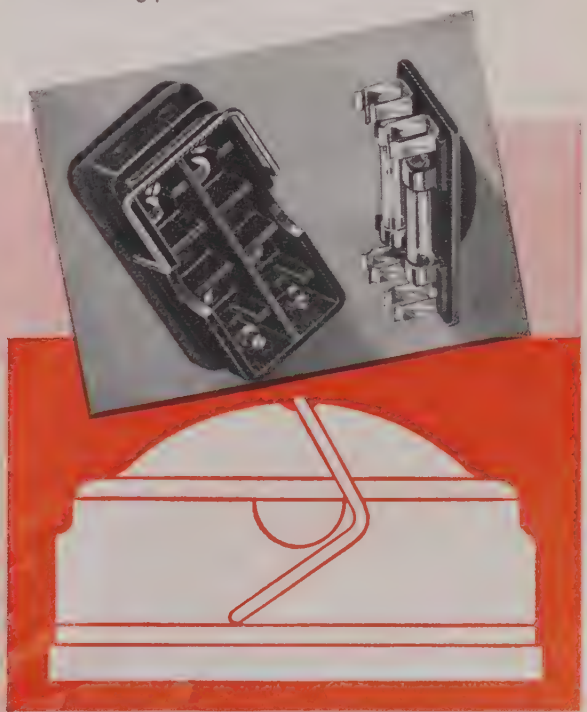


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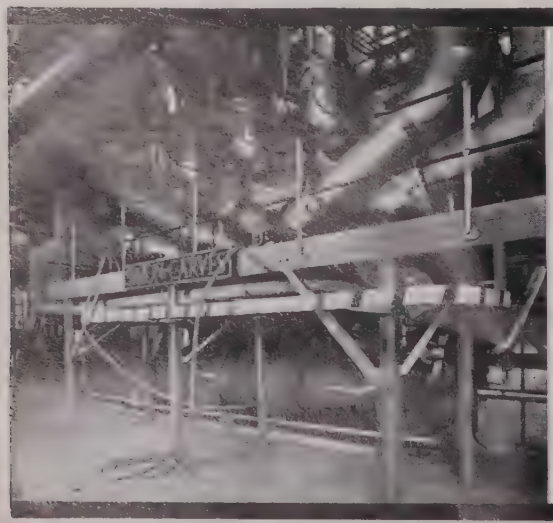
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right. The central control panel. From here, both the boiler and the high pressure turbines are controlled.



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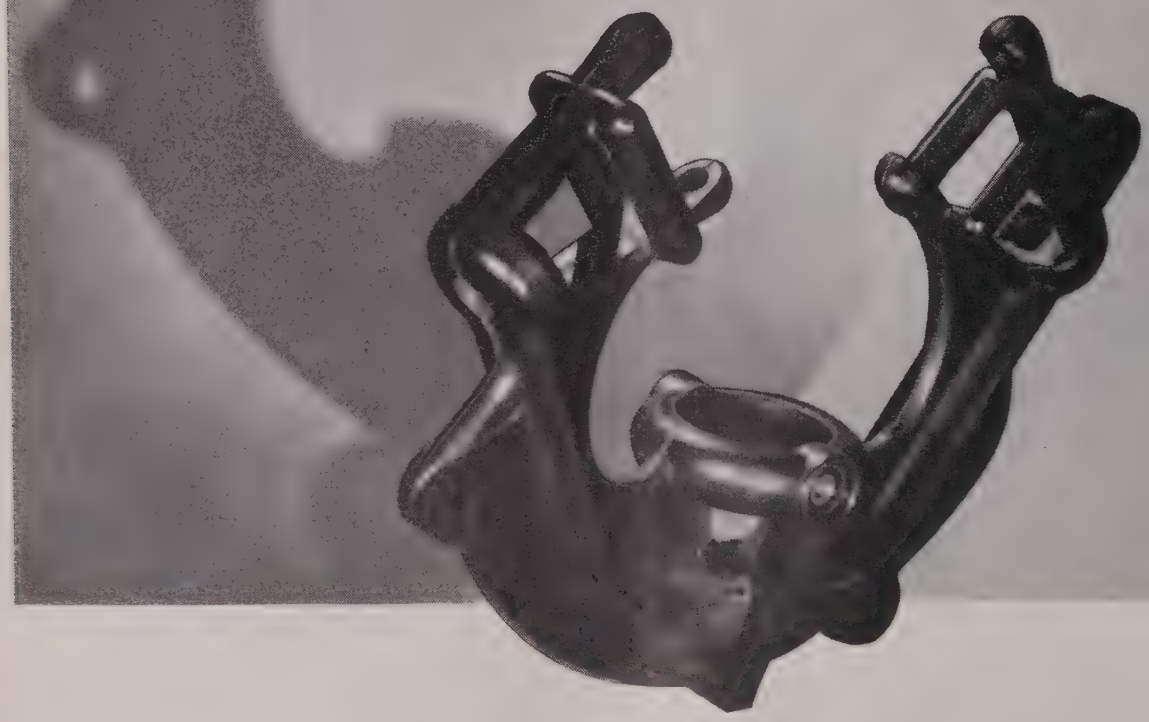
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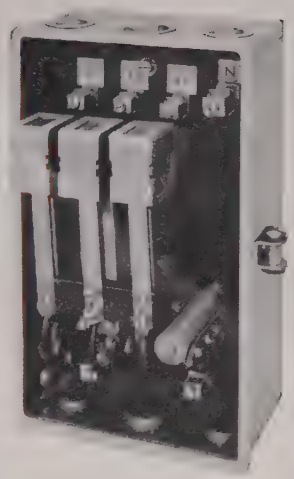
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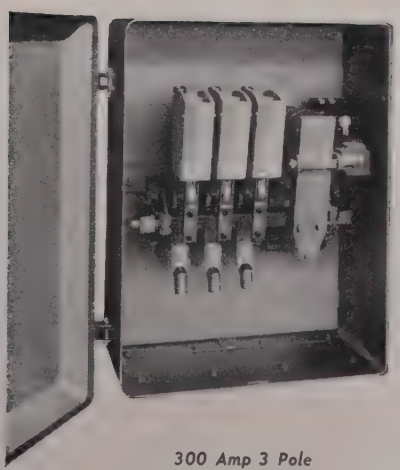
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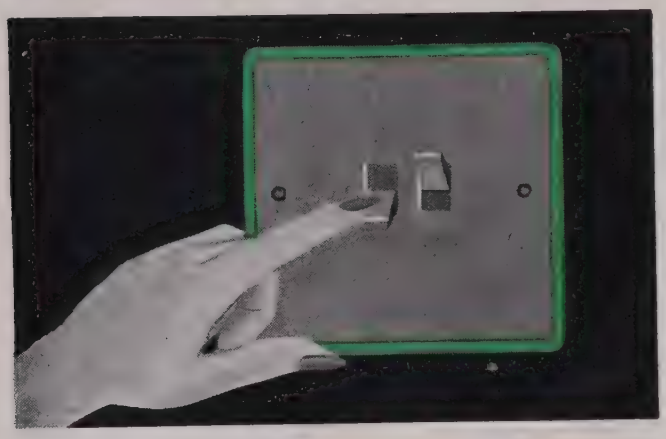
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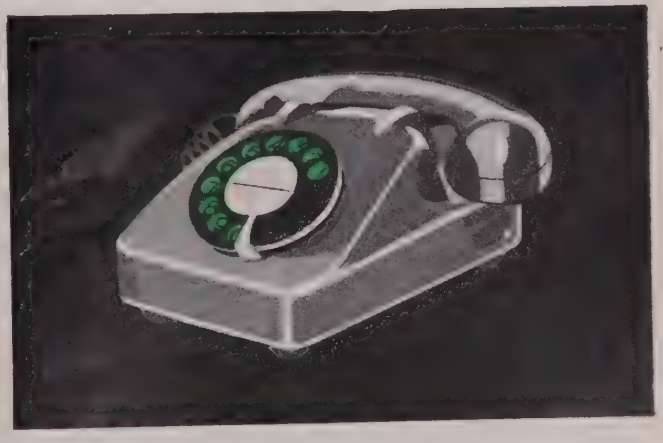












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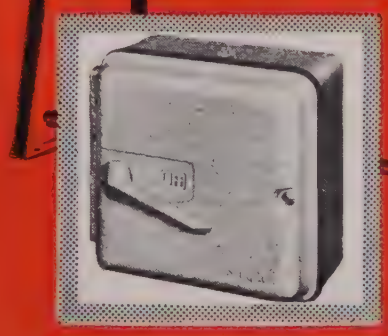
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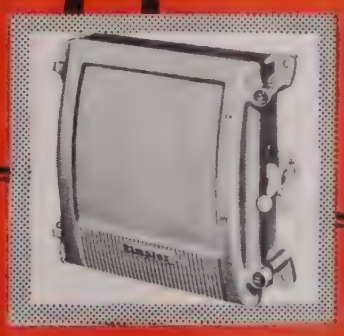
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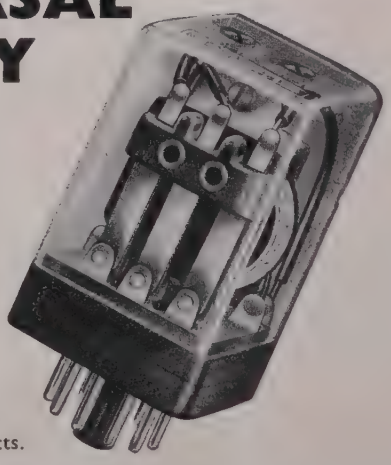
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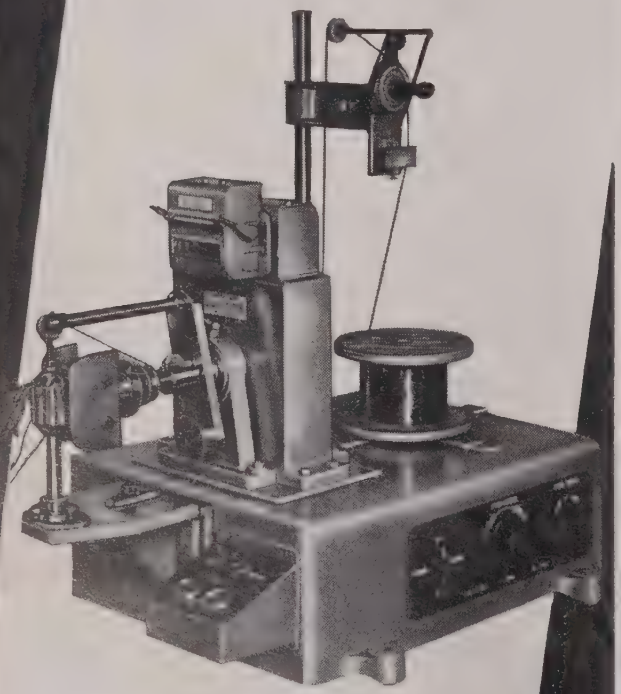
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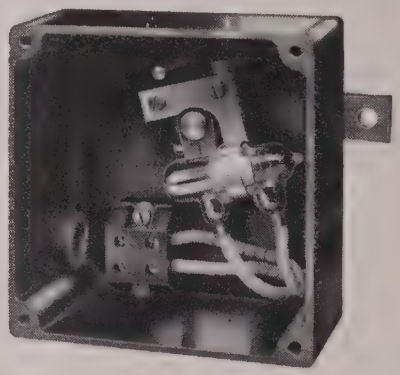
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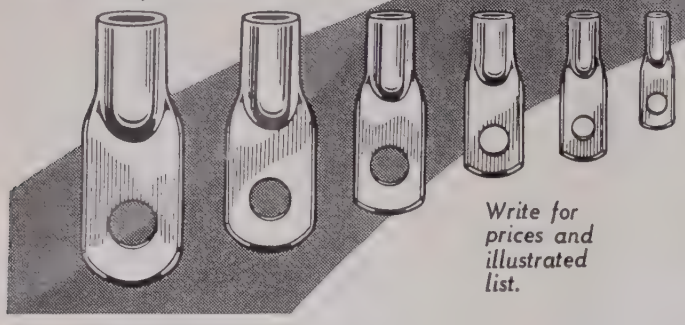
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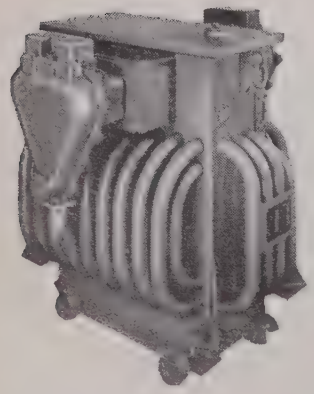
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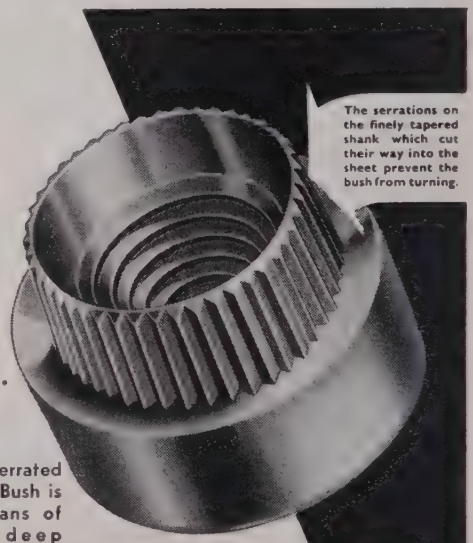
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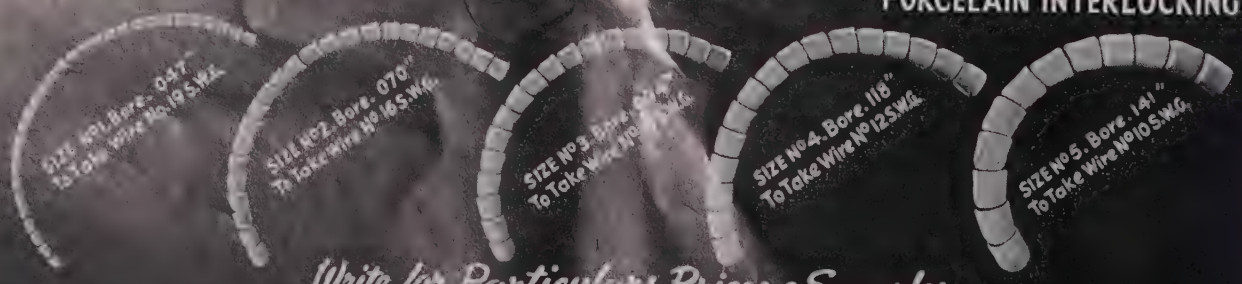
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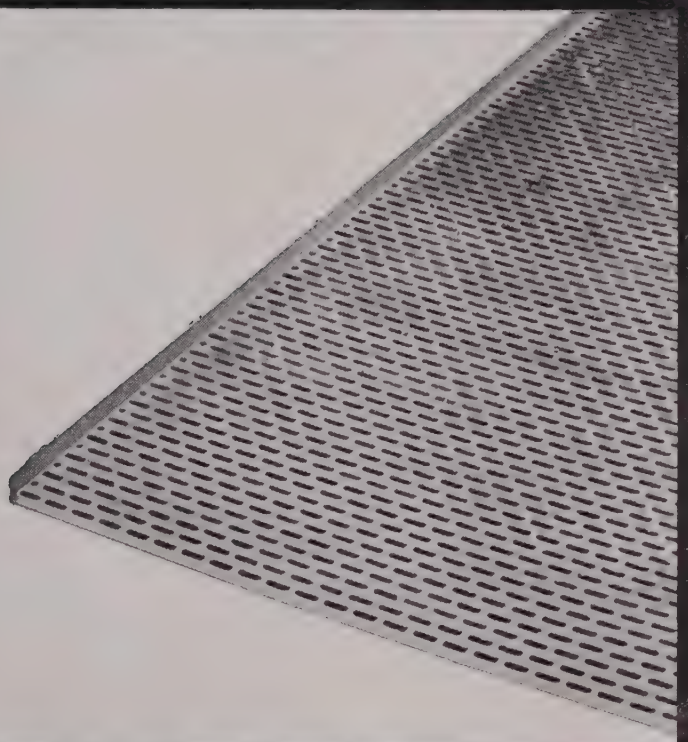
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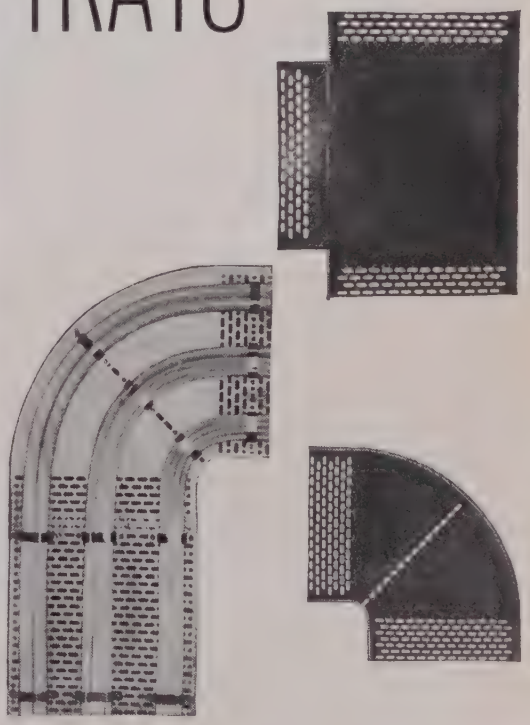
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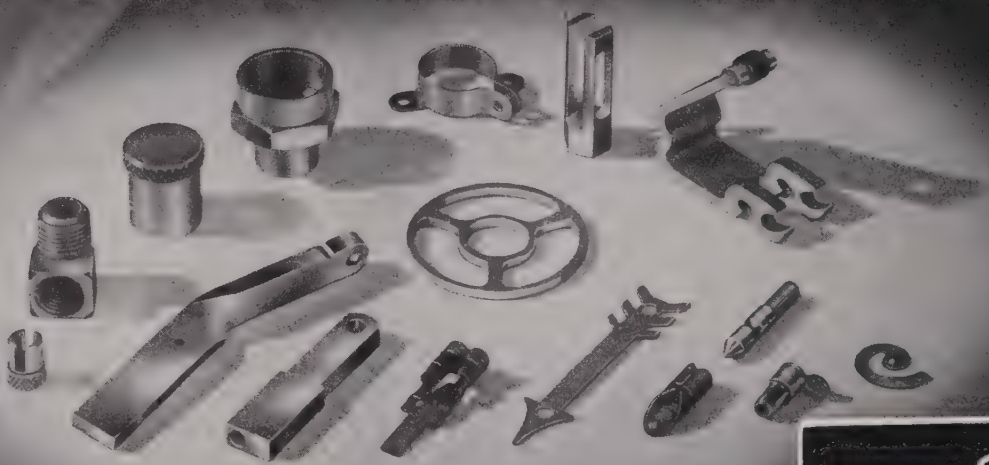
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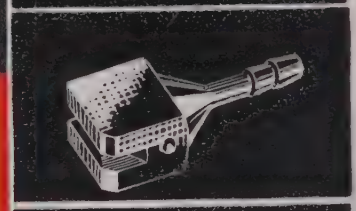
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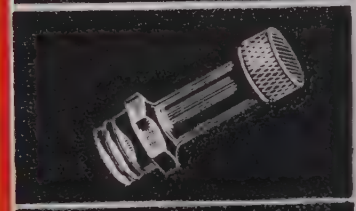
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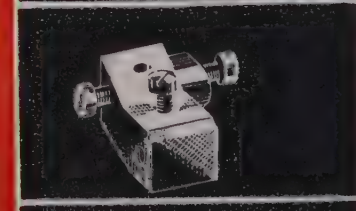


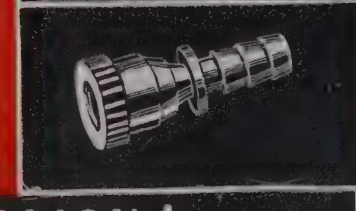












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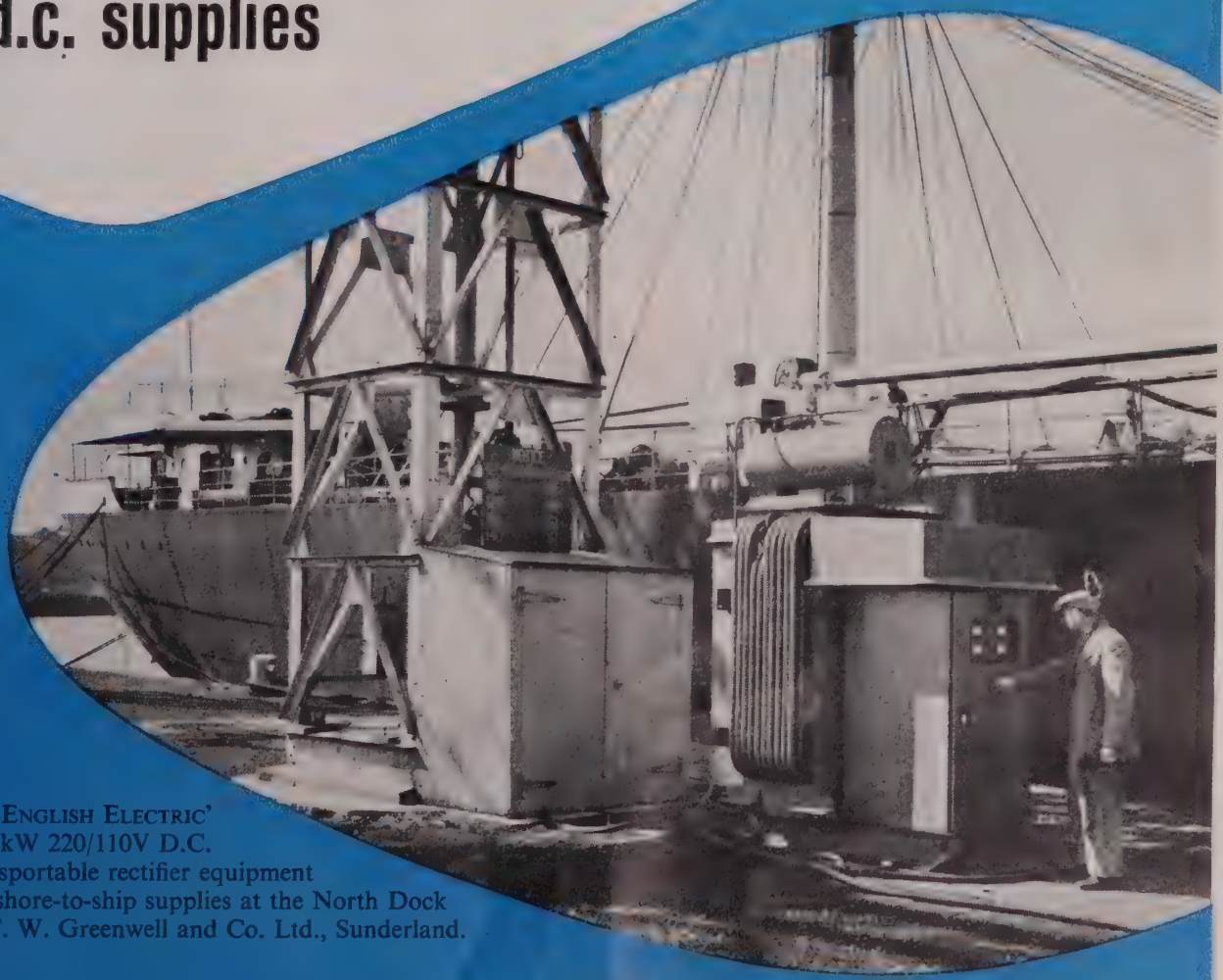
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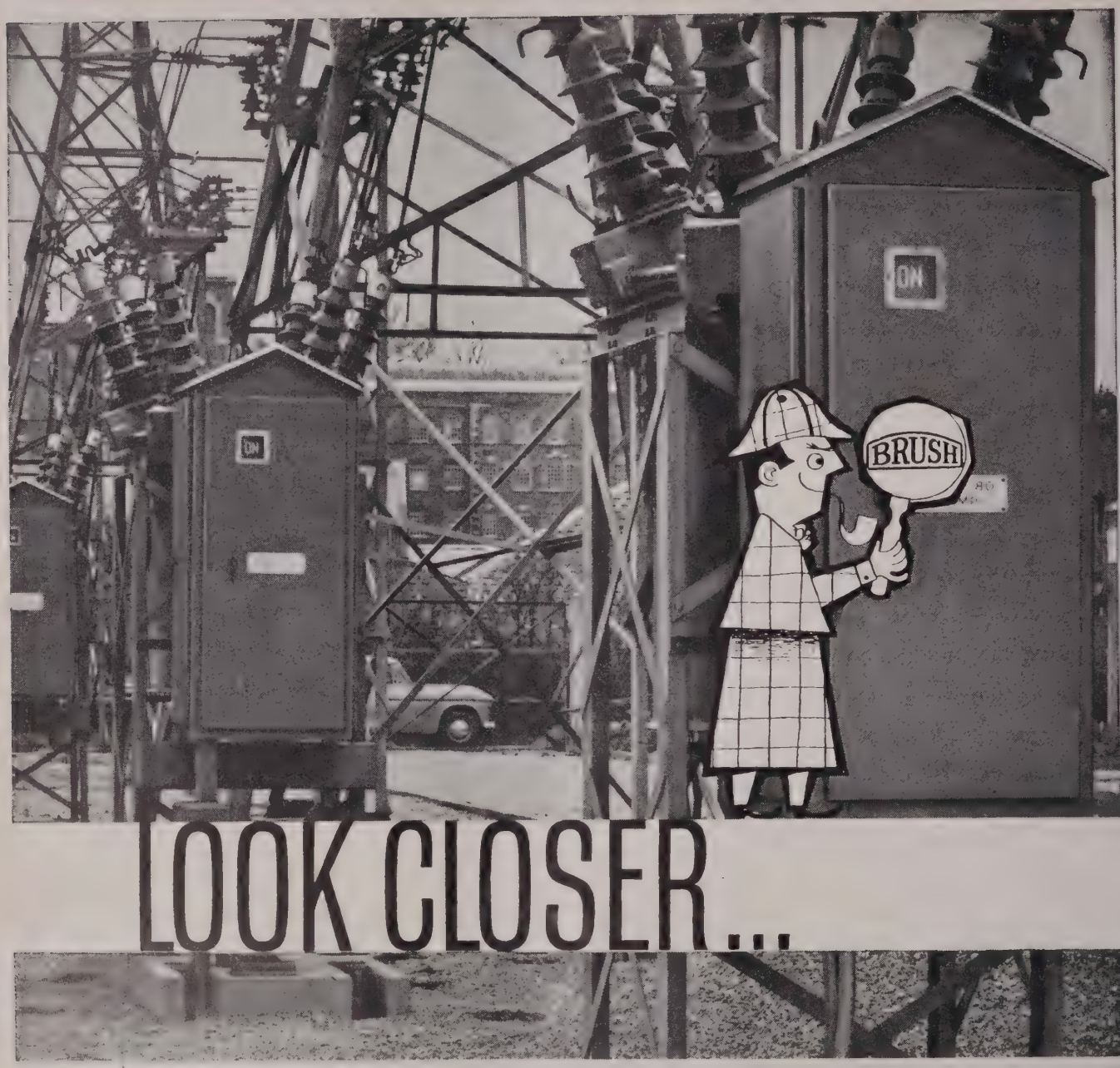


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Friday 29 September 1961 Volume 169 No 13

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ELECTRICAL REVIEW

29 September 1961 Vol. 169 No. 13 Established 1872

Insufficient Margins

As has been the case with so many industrial undertakings in the past two or three years, the electricity supply industry has sold more but earned less profit (or surplus in this instance). But the causes have been largely different. It is true that costs have gone up in electricity supply, as elsewhere, but much of the reduction in the surplus has resulted from other factors. In the case of the Central Electricity Generating Board the phenomenal increase in demand for electricity (12·1 per cent) forced it to run its less economical plant for longer periods thus cutting its margins and involving it in an actual deficit. The same increase in demand meant the sale by the Area Boards of more lower-priced units through their block tariff arrangements; there was also a substantial reduction in the surplus on their contracting and " fittings " sales departments.

The fall in the consolidated surplus occurred in the face of increased charges by both the C.E.G.B. and the Area Boards. For the reasons we have mentioned, the average revenue per kWh was actually 0·025d lower than in 1959-60. If higher sales of electricity were accompanied by an improvement in load factor the Boards could possibly carry on with their present charges but the maximum demand seems to increase at about the same rate as sales in spite of the " encouragement " of improved load factor given to the Area Boards by the Generating Board's method of charge. Additional pressure on the Area Boards to improve matters in this respect is foreshadowed: the Electricity Council's report refers to a possible " further refinement " in the bulk supply tariff. There was certainly a 42 per cent improvement in off-peak sales in 1960-61 but they still represented only about 1 per cent of the total and the Council thinks that it would be unrealistic to look for spectacular improvement. Nor can improvements in operational efficiency be expected to redress the balance.

Although the public (and much of the public Press) will fail to appreciate the necessity for it, there must be further price increases if the industry is to fulfil its obligation to meet a large part of its capital expenditure from revenue. As the Electricity Council points out, the only alternative course is increased borrowing from the Treasury, which naturally the Government would be reluctant to countenance. In any event the cost falls upon the consumers and it is probably better for them to provide the money directly.

Nevertheless, however much the electricity authorities stress the fact that the cost of their commodity has risen less than that of everything else, they are not relieved of the necessity of keeping the closest watch on their establishments and methods to ensure the utmost efficiency and economy.

BOILER FEED PUMPS

One of the interesting developments referred to in the annual report of the C.E.G.B. is in connection with boiler feed pumps and feed heating systems. It seems that all 300 MW units and above are to have turbine driven boiler feed pumps which are integrated into the feed water heating system. The reason for employing this type of drive is that it is not tied to the mains frequency and therefore has the advantage of choice of optimum speeds. In some of the earlier designs of plant of this rating, the boiler feed pumps were placed after the feed heaters which were therefore subject to an operating pressure of only about one-third of the boiler pressure. Now, the development of economical high pressure feed heaters capable of operating at full boiler pressure has resulted in the placing of the feed pumps before the heaters in the designs for the 350 MW and 500 MW plants ordered during the past year.

For driving, starting and standby feed pumps it is the intention to make increasing use of variable-speed slip-ring induction motors with liquid controllers. For instance the 11 kV motors for the 375 MW supercritical unit at Drakelow "C" will be rated at 11,400 h.p., 980/490 r.p.m. At West Thurrock slip energy recovery equipment has been ordered for use with the variable-speed slip-ring motors associated with the electrically driven boiler feed pumps. Another interesting point in connection with motor drives is that the tendency for circulating water pumps to be designed for increased outputs at relatively low speeds has made the synchronous motor a more attractive proposition than hitherto, and at Drakelow "C" 11 kV, 333 r.p.m., 3,300 h.p. motors of this type will be employed.

WELL-MERITED RECOGNITION

Before the electricity supply industry was nationalised the principal electrical event of the year was the Convention of the Incorporated Municipal Electrical Association, a gathering to which many electrical manufacturers were invited and in which they took a significant part. When the I.M.E.A. disappeared in 1948 it was widely assumed that the Convention would disappear with it, although it was felt that this was most undesirable and would leave a regrettable gap.

It was doubted whether the new British Electricity Authority would be willing, or indeed able, to continue to run such a function or to support it if somebody else organised it. As things turned out, the Convention was converted into, or succeeded by, a much more effective arrangement—the British Electrical Power Convention in which all sections of the electrical industry participated in their own right. Credit for this must go mainly to Lord Citrine, the chairman of the B.E.A., who realised the value of such a conference. Starting with the idea that the new electricity supply authorities should invite representatives of the Electricity Consultative Councils to a meeting during the following year, he went on to propose that an all-industry conference should be associated with this gathering. The various sectional organisations unanimously welcomed this and so the B.E.P.C. began.

Now the Convention Council has decided to institute a "Citrine Lecture" to be given at each future Convention by an overseas author, in recognition of Lord Citrine's initiative in this matter and his continued support of the Convention. We applaud the decision and are sure that the industry will heartily endorse it.

HELP FOR THE E.I.B.A.

Each year the number of people assisted by the Electrical Industries Benevolent Association naturally increases as additions are made to those already being helped; last year the total rose to 2,665. Actually 1,166 people went to the Association during the year, and the amount dispensed in grants, pensions and allowances went up from £55,799 to £64,496, i.e. by about 15·6 per cent. At the same time the income, at £100,299, was 9·1 per cent more. Expenses were also somewhat higher and the net result was an excess of income over expenditure of £10,137, against £11,273 in 1959.

On the face of it this does not look too bad, but in point of fact the E.I.B.A. would like to do more for those members of the electrical industry who have fallen on bad times. Particularly it aims at providing more accommodation for needy elderly people and it has embarked upon an extension of the Broome Park (Surrey) home. It is hoped that the funds for this will be forthcoming from the electrical industry's organisations; already the Electrical Wholesalers' Federation has promised extra help for this purpose. But there is also scope for the generosity of others if they feel, as they should, that this particular aspect of the Association's work is worthy of support.

ELECTRONICS IN POWER ENGINEERING

At one time electronic equipment was regarded with some suspicion by power engineers most of whom had doubts as to the reliability of such equipment. Nowadays, however, power engineers are more enlightened and this fact is well illustrated by the decision of the C.E.G.B. to exploit the use of digital computers to control the operation of generating plant. In the nuclear field the use of semiconductors in place of conventional relays and thermionic valves is being examined and in fact favoured in connection with circuits and devices designed to prevent reactor damage under fault conditions. Perhaps an even more striking example of the progressive attitude of the C.E.G.B. is in its decision to employ a.c. exciters on all large generating sets in the future. These will be directly driven from the main shafts and used in conjunction with air-cooled static silicon rectifiers and magnetic amplifier voltage regulators.

Electricity Supply Reports 1960-61

LOWER SURPLUS ON HIGHER SALES

THE fall in the electricity supply industry's consolidated surplus from £26·7 million in 1959–60 to £16·3 million in the year ended 31st March, 1961, is attributed mainly to pay awards, higher fuel prices and the reduction of £3 million in the surplus on contracting and sales of fittings. The Central Electricity Generating Board had a deficit of £1·5 million against a surplus of £5·4 million.

Sales of electricity rose by 12·1 per cent to 96,053 million kWh, a rate of increase that had not been paralleled for ten years. All classes of consumers—domestic predominating—contributed and the Area Boards in the South met the highest increases. The greater part of the increase in domestic sales came from the more extended use of existing appliances rather than from the addition of new ones. Sales of appliances dropped by £8 million.

Reviewing the financial consequences of the upward surge in electricity sales the Electricity Council say it now seems that the maximum demand will be 12 per cent higher in 1964–65 than previously estimated. To meet this the capital estimates made in 1958 will have to be increased by some £200 million to cover the period to the end of 1964–65 and the continued rise in demand would call for an outlay in excess of £400 million a year on fixed assets in the succeeding two years. This will call for increased annual surpluses during the period.

The maximum output capacity of the C.E.G.B.'s stations rose by 6 per cent and the average thermal efficiency to 26·80 per cent. The total number of consumers increased to 15,807,847 and the average price of electricity to consumers was 1·480d per kWh as compared with 1·505d in 1959–60.

SALIENT STATISTICS

	1959–60	1960–61
Max. Output Capacity (MW)	25,529	27,067
kWh Sent Out (million) ...	94,488	104,741
Thermal Efficiency (per cent) ...	26·53	26·80
Works Cost per kWh Supplied (d/kWh s.o.) ...	0·6050	0·6128
Maximum Demand (MW) ...	23,089	24,445
kWh Sold(million)	85,719	96,053
Average Revenue per kWh Sold (d)	1·505	1·480
Number of Consumers (000) ...	15,500	15,807
Area Board Sales of Electricity (£000)	536,728	587,535
Area Board Surplus on Contracting and Sales of Fittings (£000)	5,994	2,917
Consolidated Surplus All Industry (£000) ...	26,660	16,341
Net Surplus/ Deficit C.E.G.B. (£000)	+5,447	−1,508
Number of Employees, Electricity Council	518	514
Number of Employees, C.E.G.B.	53,027	55,198
Number of Employees, Area Boards... ...	135,068	137,462
Capital Expenditure (£million)	304·5	289·4

FINANCIAL PROBLEMS OF GROWING DEMAND

The Electricity Council say that there is no evidence that the rate at which maximum demand is increasing —7·15 per cent per annum over the past eleven years—will fall off, and recent experience suggests that it may well rise. In the past, however, the industry's plant programmes have been based on load forecasts below the long-term trend of demand on the assumption that any consistent departure from the present trend was likely to be downwards rather than upwards. The Electricity Council now say that it has become increasingly clear in the course of the last three years that the risks being taken have been too large.

In the first chapter of their report the Electricity Council discuss at length the financial consequences of the upward surge in electricity sales and the need for an increasing level of new construction (and consequently capital investment) to meet future higher demands.

When the 1958 financial programme was formulated it was expected that over the seven years to March, 1965, a total capital expenditure of £2,130 million would be required at 1958 price levels. In the first three years capital requirements were slightly lower than the forecast and the self-financing (45·6 per cent) slightly higher.

It is now expected that the industry will have to face a maximum demand of over 33,000 MW in the winter of 1964-65 (more than 12 per cent above the forecast made in 1958) and the most recent estimates suggest that subsequently, in the two years to 1966-67, it will rise by a further 5,000 MW. To meet this the capital estimates made in 1958 will have to be increased by some £200 million to cover the period to the end of 1964-65, and the continued rise in demand would call for an outlay in excess of £400 million a year on fixed assets in the succeeding two years.

In the seven years' period as a whole it was expected to finance 48·6 per cent of the industry's capital requirements from internal sources. To secure this average a level of just over 50 per cent will have to be achieved in the remaining four years. The self-financing programme, the Council point out, depends upon achieving planned surpluses. The term "surplus" does not imply something over and above the needs of the industry. It is a contri-

bution from revenue towards capital development.

The additional capital requirement of £200 million above the forecasts to 1964-65 and the heavy programme foreseen for subsequent years have called for a full financial review, which is taking place now in the setting of the Government's White Paper on the "Financial and Economic Obligations of the Nationalised Industries." At a result financial objectives for the Boards will be determined for a period of five years, subject to review annually, within a framework settled with the Minister of Power. For the industry as a whole this will call for increased annual surpluses during the period. These higher surpluses will be essential if the industry is to achieve a financial performance in accordance with the requirements of the Government's White Paper and is to find the capital resources it needs, while keeping its borrowings within manageable limits. But until the framework for the whole five years has been settled it is not possible to say how the industry's self-financing programme will have to be revised.

SALES AND PRODUCTION

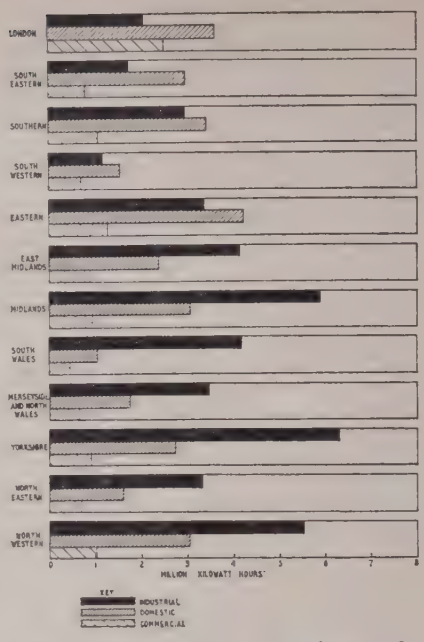
Total sales to consumers by the Area Boards and the Central Electricity Generating Board during the year were 95,053 million kWh, an increase of 12·1 per cent over 1959-60. This is the highest increase for ten years and it is particularly significant that the preceding period had itself shown a high rate of growth.

Though all classes of consumers contributed to the increase, domestic consumers predominated and as a consequence Area Boards in the South met the highest overall increases. Sales also rose steadily in the coal mining areas where there is a growing tendency to replace domestic coal with electricity.

Sales to domestic consumers rose by 17·6 per cent to 31,636 million kWh and it is recorded that the greater part of the increase came from the more extended use of existing appliances rather than from the addition of new ones. The weather, which was unpleasant for prolonged periods, without being abnormally cold, gave rise to a widespread demand for space heating. Sales of appliances declined from £51 million in 1959-60 to £43·5 million in 1960-61.

Industrial Consumption

There was an increase of 8·2 per cent to 46,702 million kWh in sales to industry, compared with an increase of only 3·5 per cent in the index of production. The continued increase in industrial consumption results from the greater use of power per unit of production and the greater expansion of those industries using more electricity per unit of output than the average for all industry. The iron and steel industry and chemicals account for 13·2 per cent and 18·5 per cent, respectively, of industrial sales and their rate of increase in consumption was well above the average. A notable sign of increasing mechanisation in the construction industry and the use of lighting for night work is the increase of 13·8 per cent in electricity consumption. The amount of electricity now used per employee (including that privately generated) is 6,000 kWh per annum, which compares with the U.S. figure of 24,000 kWh and the West German figure of 7,000 kWh.



Area Board sales to main classes of consumers, 1960–61

Rural Electrification

Progress with rural electrification has been faster than expected and at 31st March, 1961, there were 235,376 farms (83·8 per cent of the potential total) and 1,749,800 other rural premises (94·5 per cent of the total) connected. (Since the end of the year the target of 85 per cent connection by 1963 has been achieved.) Total sales to farms during the year were 1,793 million kWh, an average of 7,617 kWh per consumer. These figures show increases of 18·4 per cent and 13·0 per cent, respectively over the comparable figures for 1959-60 and even allowing for the differing weather conditions there seems to have been some real increase in basic average consumption and this, the Council stress, must continue, if possible at an increasing pace, if rural supplies are to become economic.

Sales to commercial consumers in-

THE INDUSTRY'S TRADING RESULTS

1959-60 £ million	1959-60 Per cent	1959-60 Pence per kWh sold		1960-61 £ million	1960-61 Per cent	1960-61 Pence per kWh sold	1960-61 Increase or Decrease, (−), on 1959-60 £ million
			REVENUE				
537·61	97·28	1·505	Sales of electricity	592·36	97·83	1·480	54·75
0·61	0·11	0·002	Interchange of supplies with South of Scotland Electricity Board	0·87	0·14	0·002	0·26
0·92	0·16	0·002	Sales of steam	1·63	0·27	0·004	0·71
2·53	0·46	0·007	Rentals of meters, apparatus, etc.	2·35	0·39	0·006	−0·18
2·95	0·53	0·008	Income from public lighting maintenance	3·20	0·53	0·008	0·25
6·61	1·20	0·019	Surplus on contracting and sales of fittings	3·64	0·60	0·009	−2·97
1·43	0·26	0·004	Other income	1·46	0·24	0·004	0·03
552·66	100·00	1·547	Total revenue	605·51	100·00	1·513	52·85
			less EXPENDITURE				
245·57	44·43	0·688	Generation costs and purchases of electricity	276·34	45·64	0·690	30·77
3·84	0·69	0·011	Main transmission costs	4·32	0·71	0·011	0·48
31·82	5·76	0·089	Distribution costs	35·16	5·81	0·088	3·53
16·00	2·76	0·045	Consumer service	17·51	2·89	0·044	1·51
10·50	1·90	0·029	Meter reading, billing and collection of electricity accounts	11·62	1·92	0·029	1·12
16·00	2·90	0·045	Administration and general expenses	18·27	3·02	0·046	2·27
7·07	1·28	0·020	Training, safety and welfare	7·32	1·21	0·018	0·25
1·39	0·25	0·004	Research	2·51	0·41	0·006	1·12
2·77	0·50	0·008	Rents, insurances, etc.	2·88	0·48	0·007	0·11
24·49	4·43	0·069	Rates	26·00	4·29	0·065	1·51
3·01	0·55	0·009	Changes of systems of supply (consumers' apparatus)	3·34	0·55	0·008	0·33
93·34	16·89	0·261	Depreciation of fixed assets	103·88	17·16	0·260	10·54
2·00	0·36	0·005	Amount written off Balance of consideration for undertakings vested	2·00	0·33	0·005	—
0·50	0·09	0·001	Contribution to Central Guarantee Fund	0·50	0·08	0·001	—
67·89	12·29	0·190	Interest and financing expenses	77·52	12·80	0·194	9·63
526·00	95·18	1·472	Total expenditure	589·17	97·30	1·472	63·17
26·66	4·82	0·075	Surplus	16·34	2·70	0·041	−10·32

ANALYSIS OF AREA BOARDS' SALES

Board	Population at 30.6.60 (000)	No. of consumers	Sales of Electricity (Thousands of kWh)								
			Domestic	Farm	Commercial	Combined Domestic & Commercial	Industrial	Public Lighting	Traction	Total Sales	% inc. over 1959–60
London	4,896	1,551,025	3,634,282	535	2,538,571	—	2,081,534	121,214	2,619	8,378,755	11·3
S. Eastern	3,557	1,148,250	2,997,009	123,660	819,410	161,060	1,747,575	55,381	5,998	5,910,093	13·7
Southern	4,181	1,266,430	3,423,942	251,025	1,089,719	181,566	2,979,104	56,061	16,390	7,997,807	14·1
S. Western	2,187	675,522	1,568,827	142,654	724,427	—	1,181,118	30,173	—	3,647,199	11·8
Eastern	5,342	1,637,980	4,255,187	234,460	1,291,335	203,056	3,379,264	78,111	29,184	9,470,597	13·1
E. Midlands	3,921	1,202,376	2,417,671	225,756	900,366	152,884	4,163,743	60,642	19,461	7,940,523	12·0
Midlands	4,343	1,284,147	3,083,594	194,040	944,756	233,853	5,898,535	71,513	19,140	10,445,431	11·3
S. Wales	2,027	567,048	1,062,998	74,509	443,627	—	4,202,440	33,608	8,391	5,825,573	9·3
Merseyside & N. Wales ...	2,948	825,933	1,766,859	124,561	652,654	103,916	3,475,420	49,607	—	6,173,017	11·1
Yorkshire	4,291	1,363,380	2,754,119	147,943	898,086	238,045	6,331,255	87,882	47,614	10,504,944	13·4
N. Eastern	3,099	946,238	1,611,009	91,393	668,502	—	3,318,779	50,056	33,786	5,773,525	11·4
N. Western	4,614	1,462,752	4,060,303	182,425	1,009,161	302,008	5,532,237	94,746	20,594	10,201,574	12·4
Total	45,406	13,931,081	31,635,800	1,792,961	11,980,614	1,576,388	46,702,258*	788,994	1,576,701*	96,053,116*	—
% increase over 1959–60 ...	—	—	17·6	18·4	14·4	14·2	8·2	8·2	1·8	12·1	—
Consumers	—	—	13,931,081	235,376	1,221,946	242,418	172,192	4,804	3·0	—	—
Average sales per consumer (kWh)	—	—	2,271	7,617	9,805	6,503	271,220	—	—	—	—
Revenue per kWh sold (pence)	—	—	1·613	1·573	1·996	1·765	1·253	1·560	1·190	1·480	—

* Totals include direct supplies by C.E.G.B. as follows: Industrial, 2,411,154 kWh; traction, 1,372,924 kWh; and total 3,784,078 kWh.

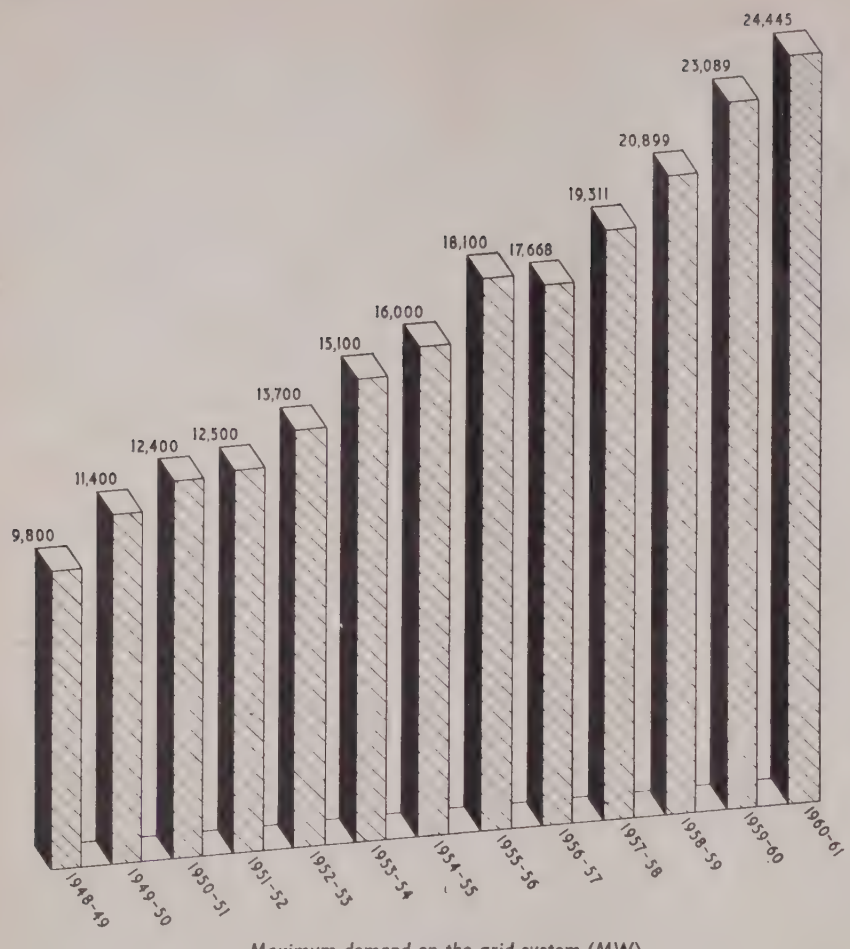
AREA BOARDS' FINANCIAL RESULTS

Area Boards	Year	Trading Revenue	Trading Expenditure	Surplus from Trading	Interest and Financing Expenses	Surplus before Transfers to Reserves
		£	£	£	£	£
London	1960–61	67,544,572	61,772,792	5,771,780	2,381,005	3,624,334
	1959–60	*63,353,694*	*57,654,648*	*5,699,046*	*2,194,119*	*3,673,144*
South Eastern	1960–61	41,504,237	38,947,873	2,556,364	1,809,252	971,728
	1959–60	*37,361,786*	*35,822,919*	*1,538,867*	*1,559,765*	*142,214*
Southern	1960–61	53,002,597	47,972,943	5,029,654	2,540,018	2,760,497
	1959–60	*47,403,794*	*43,944,085*	*3,459,709*	*2,226,315*	*1,439,040*
South Western	1960–61	26,258,281	24,544,755	1,713,526	1,462,083	448,321
	1959–60	*24,191,244*	*22,208,860*	*1,982,384*	*1,260,397*	*879,009*
Eastern	1960–61	66,357,029	60,095,975	6,261,054	3,360,509	3,484,202
	1959–60	*60,644,426*	*54,151,247*	*6,493,179*	*3,118,229*	*3,866,373*
East Midlands	1960–61	49,045,894	45,585,733	3,460,161	2,452,592	1,165,985
	1959–60	*44,538,587*	*40,933,696*	*3,604,891*	*2,229,204*	*1,528,136*
Midlands	1960–61	64,104,865	59,913,174	4,191,691	2,885,366	1,673,362
	1959–60	*58,729,092*	*53,589,078*	*5,140,014*	*2,599,843*	*2,808,932*
South Wales	1960–61	31,267,735	29,579,845	1,687,890	1,809,023	54,415
	1959–60	*28,339,249*	*26,346,139*	*1,993,110*	*1,600,789*	*555,172*
Merseyside and North Wales	1960–61	35,937,079	33,651,156	2,285,923	1,551,424	981,854
	1959–60	*32,941,693*	*30,346,348*	*2,595,345*	*1,349,056*	*1,426,733*
Yorkshire	1960–61	58,111,684	55,933,897	2,177,787	2,879,571	405,535
	1959–60	*52,262,645*	*48,043,010*	*4,219,635*	*2,514,898*	*1,944,494*
North Eastern	1960–61	34,770,323	31,458,951	3,311,372	1,613,217	1,862,265
	1959–60	*32,232,327*	*29,568,016*	*2,664,311*	*1,471,678*	*1,318,850*
North Western	1960–61	60,893,572	57,684,881	3,208,691	2,414,335	432,733
	1959–60	*55,888,475*	*52,357,571*	*3,530,904*	*2,207,283*	*1,630,495*
TOTALS	1960–61	*587,534,927	*545,879,034	41,655,893	27,158,395	17,848,517
	1959–60	*536,727,727	*493,806,332	*42,921,395*	*24,331,576*	*21,212,592*

* Excluding inter-Board bulk supplies 1959–60, £1,159,285 and 1960–61, £1,262,941.

ELECTRICAL CONTRACTING AND SALES OF FITTINGS TRADING ACCOUNTS, 1960–61

Area Boards	Contracting					Sales of Fittings					Total Gross Profit	Indirect Costs	Surplus after Charging Rents Rates and Insurance
	Total Sales	Direct Cost of Sales			Gross Profit	Sales			Direct Cost of Sales	Gross Profit			
		Materials	Wages, Superannuation, etc.	Total		Cash and Credit	Hire Purchase and Similar Sales	Total					
	£	£	£	£	£	£	£	£	£	£	£	£	£
London ...	2,597,499	1,188,400	936,490	2,124,890	472,609	1,222,586	2,500,882	3,723,468	2,851,002	872,466	1,345,075	975,281	319,794
S. Eastern ...	1,649,680	645,680	506,691	1,152,371	497,309	1,661,213	2,246,930	3,908,143	3,017,128	891,015	1,388,324	991,195	337,229
Southern ...	2,237,700	861,286	697,430	1,558,716	678,984	1,629,603	2,196,060	3,825,663	2,939,058	886,605	1,565,589	1,155,149	319,240
S. Western...	1,402,475	551,731	463,424	1,015,155	387,320	1,372,515	1,783,492	3,156,007	2,429,697	726,310	1,113,630	850,572	216,258
Eastern ...	3,133,130	1,373,113	923,332	2,296,445	836,685	2,410,305	4,329,721	6,740,026	5,143,791	1,596,235	2,432,920	1,958,022	382,898
E. Midlands...	867,015	406,658	241,965	648,623	218,392	726,210	1,366,578	2,092,788	1,624,735	468,053	686,445	516,059	133,486
Midlands ...	2,775,115	1,208,384	749,560	1,957,944	817,171	1,707,416	3,628,848	5,336,264	4,107,164	1,229,100	2,046,271	1,685,492	254,279
S. Wales ...	747,047	333,816	221,058	554,874	192,173	554,933	1,142,092	1,697,025	1,323,360	373,665	565,838	512,682	30,256
Merseyside & N. Wales	1,123,144	480,768	367,028	847,796	275,348	759,546	2,059,233	2,818,779	2,181,018	637,761	913,109	691,871	177,238
Yorkshire	1,320,850	601,123	362,404	963,527	357,323	963,076	2,152,821	3,115,897	2,423,540	692,357	1,049,680	746,243	238,737
N. Eastern ...	711,653	412,883	142,711	555,594	156,059	631,484	1,430,145	2,061,629	1,611,619	450,010	606,069	388,870	181,499
N. Western	1,529,820	688,980	431,492	1,120,472	409,348	1,323,481	3,697,336	5,020,817	3,861,986	1,158,831	1,568,179	1,168,916	325,663
TOTAL ...	20,095,128	8,752,822	6,043,585	14,796,407	5,298,721	14,962,368	28,534,138	43,496,506	33,514,098	9,982,408	15,281,129	11,640,352	2,916,577



Maximum demand on the grid system (MW)

creased by 14·4 per cent over the 1959-60 figure to 11,981 million kWh, part of the increase coming from the extended use of electricity for water and space heating and from the increased use of general and display lighting. Electricity also continued to make an important contribution to road safety through the further development of street lighting systems, and there was growing interest in the off-peak storage heating of roads to prevent icing.

Shift of Peak Load

The thermal storage space heating load in Great Britain now totals some 1,400 MW; this includes 650,000 kW of floor warming, 550,000 kW of storage block heaters and 200,000 kW of hot water systems. Consumers taking supplies under off-peak tariffs at the end of the year numbered 87,000 (a 40 per cent increase over 1959-60) and consumption rose by 42 per cent to 1,016 million kWh.

This contributed to a sharp rise in load factor from 46·9 per cent in 1959-60 to 49·4 per cent last year. Adjusted for differences in the weather the figures would be 47·4 and 48·5, respectively.

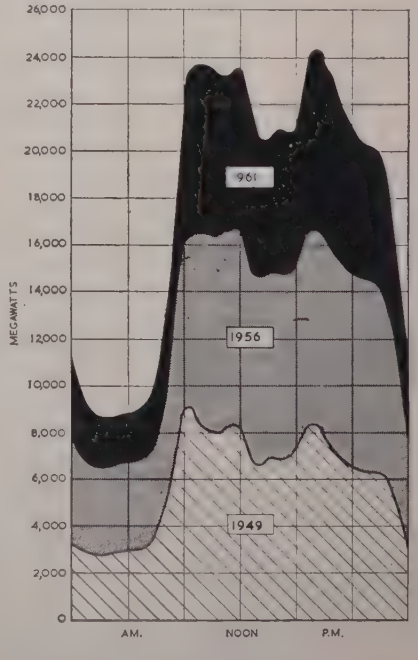
Not only has demand doubled over the past ten years but there has been a considerable shift in the incidence of requirements during the day. From 1949, when the major demand built up to a peak around nine o'clock in the morning (see diagram), there has been a gradual shift of the peak to late afternoon. Maximum demand now tends to occur at about half past five in the evening on a cold winter's day, when the demands of all classes of consumers overlap. The pattern could be affected by changes in consumers' activities following the introduction of a shorter working week in industry. It is significant that the base load on power stations has increased some 25 per cent faster than maximum demand. In 1948-49 minimum demand on a typical winter day was 31 per cent of maximum; in 1960 it was about 38 per cent.

Power Station Output

In 1960-61 C.E.G.B. stations generated 111,414 million kWh; this was 10·8 per cent above the previous year's figure and was the highest rate of increase recorded since 1954-55. The maximum demand occurred in mid-December and amounted to 24,445 MW, 5·9 per cent higher than in 1959-60. The system load factor, statistically adjusted for weather and working days, rose to 48·5 per cent and so continued the improvement of the previous twelve years. The plant availability at the time of the winter peak was 91·8 per cent.

Due to the commissioning of new plant operating under more advanced steam conditions, and to improvement in operating techniques, the average thermal efficiency of steam stations improved from 21·69 per cent in 1950-51 to 26·8 per cent in 1960-61. The improvement over the previous year was, however, not as great as in some earlier years due to the need to run older and less efficient plant for longer periods during the colder weather of the autumn of 1960 and to delays in commissioning some modern plants. The twenty thermally most efficient stations, which furnished over 20 per cent of the Board's output capacity and supplied 28 per cent of the national output, reached an average of 31·83 per cent, headed by Blyth "A" and Agecroft "C" with 34·11 per cent each.

Because of the marked increase in the consumption of electricity, the Board's requirements of coal were greater than had been forecast. Fuel burnt at power stations included 48·1 million tons of coal and 5·3 million tons of heavy fuel oil. During the six months from October, 1960, to March, 1961, 28 million tons of coal were consumed, compared with 25·5 million tons in the corresponding period of the previous year. The average cost of coal delivered rose by 1s 6d per ton over the previous year's figure to £3 16s 7d. This was due



Variation of system demand on typical winter days

partly to an increase in pit-head prices coupled with the increased cost of operating the Board's collier fleet.

The average works cost per kWh supplied from steam stations increased from 0·6021d in 1959-60 to 0·6093d in 1960-61, but as a result of improved efficiency of generation the heat consumption per kWh supplied fell by 1·0 per cent. Stations with a cost of 0·6d per kWh provided 55·4 per cent of the total output capacity, but produced 75·4 per cent of the total output of electricity.

Trading Results and Investment

Among the more important reasons for the decline in the industry's surplus from £26·7 million to £16·3 million in 1960-61 were the pay awards and higher fuel prices which together cost the industry £14·6 million. Higher interest rates and increases in depreciation cost another £3 million, and a further factor was the reduction of £3 million in the surplus on contracting and sales of fittings mainly due to the Government's restrictions on hire-purchase sales.

The large increase in the volume of sales of electricity also significantly affected the year's income. The revenue per kWh sold fell to 1·480d and although 12·1 per cent more electricity was sold total revenue increased by only 10·2 per cent. The unexpectedly high rise in sales also had an adverse effect on costs as greater use had to be made of older, less efficient power stations. This reduced savings from improvements in thermal efficiency and from the greater concentration of generation where coal is cheapest. Nevertheless, the improvement in average thermal efficiency during the year saved the industry about £2·2 million compared with 1959-60.

As in previous years the surplus has been wholly employed in financing the industry's capital requirements. The total internal resources during the year amounted to £133 million or 46·2 per cent of total requirements, against 43·6 per cent in 1959-60. The internal resources plus interest charges represented a gross yield on the average (net) assets employed of 10·8 per cent (1959-60, 11·3 per cent) and a net yield of 4·8 per cent (5·4 per cent).

Cash sales of appliances and contracting were well maintained and the gross profit margins on turnover were little different from the previous year. Indirect costs rose to 18·3 per cent of turnover, mainly as a result of lower sales, and the net margin to turnover fell from 8·6 per cent to 4·6 per cent. Nevertheless in only two of the past 12 years has the net surplus of £2·92 million been exceeded.

The C.E.G.B. had a deficit on the year's working of £1·5 million against a surplus of £5·4 million in 1959-60. Adverse factors were a smaller improvement than expected in thermal efficiency and higher wages and interest rates. The aggregate surplus of the Area Boards for the year was £17·8 million, as compared with £21·2 million in 1959-60.

The industry spent £294·9 million on fixed assets during the year and the Generating Board's share of £196·2 million included £53·3 million for nuclear power stations. Although the consolidated surplus fell by over £10 million, this loss of internal resources was offset by a corresponding growth in the annual provision for depreciation. The rise in the self-financing ratio from 43·6 per cent to 46·2 per cent is, therefore, attributable to the reduction in capital requirements from £304·5 million in 1959-60 to £289·4 million in 1960-61.

The total net capital employed at the end of the year was £2,119 million, of which £2,075 million was employed in the actual generation, transmission and distribution of electricity. (The small balance comprises external investments.) Fixed assets represented £2,030 million or 95·8 per cent of net capital employed (at original cost less depreciation).

GENERATION AND TRANSMISSION

During the year under review, four generating stations were closed down in England and Wales. The 230 stations in service at the end of last March were capable of sending out 27,067 MW, which represents a net increase during the year of 6 per cent. This decrease in the number of operational power stations has been brought about by the policy of installing larger sets. In fact, the total generating capacity has more than doubled during the past ten years and at the same time the number of power stations has been reduced by just over 20 per cent. During 1960-61 the total installed output capacity of generating sets was increased by 1,668 MW. Allowing for plant shut down, the effect was a net increase in total maximum output capacity of 1,538 MW.

Four new steam power stations were brought into operation: Staythorpe "B" (Newark), Skelton Grange "B" (Leeds), Rugeley (Staffordshire), Uskmouth "B" (Newport), while a new steam section was added at Belvedere H.P. At all five stations 120 MW turbo-generator/boiler units were installed operating with turbine stop-valve steam conditions of 1,500 p.s.i. and 1,000°F with reheat to 1,000°F.

MAIN TRANSMISSION SYSTEM

In commission at 31st March	Units	1960	1961
Overhead lines,			
275 kV ...	Route miles	1,314	1,487
132 kV ...	,,	5,203	5,558
66 kV and below	,,	66	79
Total	,,	6,583	7,124
Underground cables,			
275 kV ...	Route miles	1	2
132 kV ...	,,	158	175
66 kV and below	,,	285	230
Total	,,	444	407
Substations ...	number	439	484
Transformer capacity,			
275 kV ...	MVA	7,920	11,760
132 kV ...	,,	31,450	34,450
66 kV and below	,,	1,936	2,076
Total	,,	41,306	48,286

The new generating plant requirements for 1965 are based on a winter peak of just over 33,000 MW and a plant availability of 90 per cent. Allowing for the retirement of old generating plant, a figure of 2,421 MW is required. This programme for 1965 includes six conventional stations with an aggregate output capacity of 1,856 MW and two nuclear stations, Dungeness "A" and Sizewell "A," with a total capacity of 565 MW.

The development of larger high performance generating units continues and during the year orders were placed for eight 500 MW and four 350 MW turbo-generator/boiler units. All of these will have single-shaft machines designed for steam conditions of 2,300 p.s.i. and 1,050°F with reheat to 1,050°F. Two supercritical units of 375 MW each with steam conditions of 3,500 p.s.i. and 1,100°F reheating to 1,050°F were also ordered. The Board states that the extra capital charges involved will be offset by economies in generation costs.

Nuclear Progress

Uranium fuel was delivered to the Board's first two nuclear power stations, Berkeley, Glos., and Bradwell, Essex, to provide the initial charge for the first reactor at each station. Pre-commissioning tests were commenced in preparation for fuel loading in the early summer of 1961. Modifications were made to the design of fuel elements to give adequate life in the reactors and the necessary design changes were incorporated in the first charges of fuel at Bradwell and Berkeley.

At Hinkley Point, No. 1 reactor pressure vessel was completed and pressure tested. Progress was maintained with the construction of the

GENERATION STATISTICS

All Stations	Units	1959–60	1960–61
Power stations in operation	number	234	230
Maximum output capacity	MW	25,529	27,057
Electricity generated	kWh × 10^6	100,555	111,414
New power stations commissioned	number	6	4
Capacity of new plant	MW	2,355	1,780
Plant shut down	MW	316	184
Steam Stations Only	**Units**	**1959–60**	**1960–61**
Power stations in operation	number	203	199
Maximum output capacity	MW	25,386	26,934
Electricity generated	kWh × 10^6	100,411	111,196
Electricity sent out	kWh × 10^6	94,346	104,526
Fuel burned—			
Coal	tons × 10^6	43·26	47·73
Oil	,,	4·50	5·41
Other types	,,	1·08	0·83
Total	,,	48·84	53·97
Coal, average calorific value	B.Th.U/lb	10,383	10,206
Coal, per cent pulverised	%	69·9	71·3
Heat rate	B.Th.U/kWh.s.o.	12,860	12,733
Thermal efficiency	%	26·53	26·80
Coal price (excl. handling)	d/ton	901·0	919·3
Fuel handling	,,	44·5	44·8
Employees	number/MW	1·48	1·38
Works Costs			
Fuel, including transport	d/kWh.s.o.	0·5003	0·5082
Fuel and ash handling	,,	0·0231	0·0231
Operation salaries and wages	,,	0·0360	0·0366
Oil, water and stores	,,	0·0039	0·0036
Repairs and maintenance	,,	0·0388	0·0378
Total works costs	,,	0·6021	0·6093

station at Trawsfynydd where the fabrication of No. 1 reactor pressure vessel reached an advanced stage. Contracts were placed for a 550 MW station at Dungeness, Kent, and a 580 MW station at Sizewell, Suffolk. Site construction commenced at Dungeness in the autumn and work at Sizewell in April, 1961. The Board invited tenders for a 600 MW station to be constructed at Oldbury, Glos.

In connection with the design of circuits and devices to protect reactors from damage under fault conditions, the Board is supporting the development of components employing semiconductors to replace conventional relays and thermionic valves. The Board also states that reactor pressure vessels made of reinforced concrete show promise of significant technical and economic advantages over vessels fabricated from steel plate. It is also interesting to note that consideration is being given to a large reactor based on the prototype advanced gas-cooled reactor (A.G.R.) which is being constructed by the United Kingdom Atomic Energy Authority at Windscale.

Steam Plant Development

An interesting feature of the design of new stations is that all units of 300 MW and above have turbine-driven boiler feed pumps which are integrated into the feed water heating system. This type of drive is not tied to the supply frequency so it is possible to choose the optimum operating speed. In future, all large generators will have a.c. exciters directly driven from the main shafts, used in conjunction with air-cooled static silicon rectifiers and voltage regulators incorporating magnetic amplifiers.

A contract was placed for a digital computer to control automatically the start-up of one of the boilers at West Thurrock. The first trial installation of automatic data logging equipment was commissioned at Northfleet, and a second was ordered.

Transmission at 400 kV

To reduce the number of new h.v. lines needed to meet increasing power demands, a 400 kV main transmission system is to be introduced. The majority of existing 275 kV lines were designed for conversion to 380 kV, and increased transmission capacity will be provided by re-insulating 275 kV lines and operating them with new transformers and switchgear at 400 kV. The capacity of each double-circuit line will thus be raised from 1,200 to 1,800 MW.

The laying of the cables for the cross-Channel power link between England and France was completed on 9th June, 1961. The cost of this 160 MW link will be about £4·6 million which will be shared between the Board and Electricité de France. There were 620 faults on the transmission system during the year, compared with 614 in 1959-60. Of these, 93·9 per cent were dealt with correctly by the automatic protection equipment, compared with 93 per cent in 1959-60.

Research

New research laboratories were built at Berkeley for nuclear work and plans for an engineering laboratory at Marchwood, near Southampton, were approved by the Board. Full details of the Berkeley nuclear laboratories were given in our issue of 2nd June last.

Research expenditure for the year ending 31st March, 1961, was £4,885,546, of which £2,514,301 was charged to revenue and £2,371,245 to capital. A good beginning has been made by each of the five Regions in setting up their new research organisations whose main function is to improve technical standards and to conduct research into the operation of power stations and the grid system. The Board continues to extend its facilities for research and development work on generation and transmission. The extension of the Central Electricity Research Laboratories at Leatherhead proceeded, and parts were brought into use.

Much of the Board's research is still in its early stages, but with the extension of laboratory facilities, small-scale and pilot-scale experimental rigs were built to carry out many new research projects and some of these were operating by the end of the year. Supporting work included surveys of the feasibility and economics of new processes, together with simulations on the Board's computers and data processing equipment. The Board continued to give financial support to research in universities, generally for fundamental work.

No Immediate Increase in Tariffs

At a joint Press conference on Tuesday at which Sir Robertson King presided, Mr. R. S. Edwards, chairman-designate of the Electricity Council, said he thought that except in one or two cases tariff increases already announced would see the Area Boards through to the end of 1962-63. But in the following year most Boards would be moving towards higher charges.

In the course of an eloquent explanation of the C.E.G.B.'s deficit of £1·5 million, Sir Christopher Hinton, chairman, said that a main reason had been that they had sold more electricity than expected and they had sold it at the wrong time. In addition to the unexpected growth in demand, particularly during August, September and October, the position had been aggravated by some delay and teething troubles in commissioning new high-efficiency sets. In today's conditions, he said, the outage of a modern set could cost £4,000 a day.

A more detailed survey of the reports of individual Area Boards and a further discussion of points of interest in the main reports will be published in next week's *Electrical Review*



General view of Hinkley Point nuclear power station taken from the north east, showing No. 1 reactor building at the left with the turbine hall on the right

HINKLEY POINT

GRAPHITE CORE LAYING COMMENCED

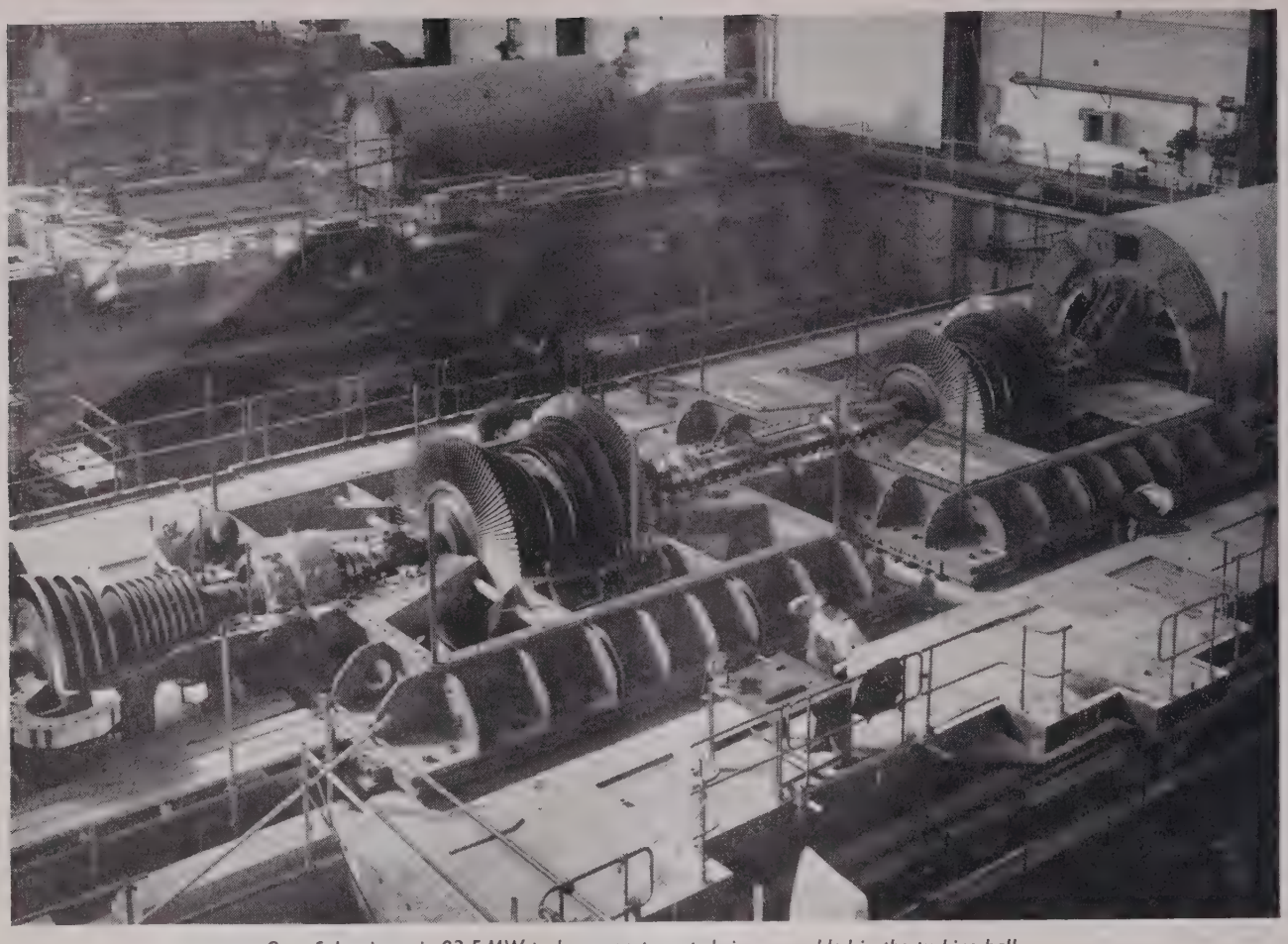
THE construction of a nuclear power station can be divided into three stages. Construction of the civil works occupies the first stage and this is followed by the main mechanical engineering aspects of the work. The final stage is the installation of the electrical equipment. Obviously, these stages overlap each other, but the final stage usually coincides with the commencement of laying the graphite core. From this point of the construction, much closer estimates can be made of the final completion date, since from this date onwards, time schedules have to be more closely controlled and followed. Progress at Hinkley Point has now reached this final phase with the commencement of graphite laying in No. 1 reactor. It is expected that fuel loading of No. 1 reactor will commence in February, 1963, followed by fuel loading of the second reactor in July, 1963. It is now estimated that the first reactor will operate at full load for the first time in September, 1963, and the second reactor will be in full operation by March, 1964.

When work began on site in December, 1957, the station was then scheduled for completion in 1962. The time lost, mainly due to labour troubles, has, however, been put to good advantage by the incorporation of various design changes. The station was ordered at a tender price of £60 million (including the initial fuel charge), but design changes have added an extra sum at present estimated to be something over £5 million.

The 500 MW Hinkley Point nuclear power station in Somerset, which is being built by the English Electric, Babcock & Wilcox, Taylor Woodrow Atomic Power Group, was described in detail in our issue of 20th Semptember, 1957. It will have two reactors of the graphite-moderated, gas-cooled type, fuelled with natural uranium. Each reactor will have a heat output of 966 MW. The reactor pressure vessels, which will operate at a pressure of 180 p.s.i., are 67ft diameter spheres and are fabricated on site from 3in steel plate. The first reactor building is virtually complete, with passenger and goods lifts in operation, and with plant being installed to deal with loading of the uranium fuel

The control charge nozzles being drilled on No. 2 reactor pressure vessel. Some of the standpipes, which will protrude above the pile cap flooring can be seen in position on the left





One of the six main 93·5 MW turbo-generator sets being assembled in the turbine hall

and the instrumentation for the reactor. The burst slug detection apparatus is being installed, the precipitator panels are in place together with their associated tubing as well as the motor-generator sets for the control rod motors. All six main gas-circulator casings for the reactor are in place and some of the rotors for other circulator pumps are already on site. Within the 7ft thick biological shielding walls, the pressure vessel, which has been successfully stress relieved and pressure tested, is now being loaded with graphite. Concrete is being poured to form the 11ft thick pile cap structure above the pressure vessel, which will form the main fuel charging and discharging floor. The six heat exchangers for this reactor are now tubed and each of these boilers is being fitted with the steel gas ducts between them and the pressure vessel.

In the second reactor building the pressure vessel has been stress relieved and has successfully undergone its pressure test. The standpipes are being welded to the nozzles and the erection of the gas ducting is proceeding. The main gas circulator houses are now complete and all six drive motors for the circulators have been delivered.

The 740ft long turbine hall is almost complete and the first of the six main English Electric 93·5 MW turbines is being installed. Four of the main generator stators and two of the three 93·5 MW turbo-generator stators have been delivered to site. Eight of the boiler feed pumps have been installed in the basement of the turbine hall. In the transformer annexe are two 11 MVA station transformers, four 110 MVA generator transformers and all the auxiliary transformers. Most of the switchgear is in the electrical annexes and some of the instrument panels are now in the main control room.

One of the main constructional features of this station, the cooling water system, is now virtually complete. The intake structure, some 2,000ft offshore, is connected by 11ft diameter tunnels to a 70ft deep pumphouse. The six 72in bore, 96,000 gal/min vertical centrifugal pumps, each driven by a 1,750 h.p. motor have been completed. The 400 ton Goliath crane is being dismantled ready for transportation to the site of the 580 MW nuclear power station at Sizewell.

FARADAY LECTURE

THE 1961-62 Faraday Lecture is to be delivered by Mr. D. A. Barron, M.Sc., M.I.E.E., his subject being "Expanding Horizons in Communications." The lecture will be given at the Central Hall, Westminster, on 14th February, 1962, and applications for tickets, enclosing a stamped, addressed envelope, should be made to the Secretary, Institution of Electrical Engineers, Savoy Place, London, W.C.2. The lecture will also be delivered at Bristol on 21st November, 1961; Cardiff on 23rd November; Birmingham on 2nd January, 1962; Stoke-on-Trent on 4th January; Nottingham on 25th January; Sheffield on 30th January; Southampton on 6th February; Newcastle-on-Tyne on 20th February; Liverpool on 1st March; Belfast on 7th March; and Glasgow on 29th March.

VIEWS on the NEWS

By "REFLECTOR"

A CERTAIN amount of publicity is being given to fire hazards caused by time switches used to control domestic electrical appliances. Some of this, although carefully worded, will I am afraid be misinterpreted as condemnation of the switches, but this is not intended. The current issue of the quarterly journal of the Fire Protection Association contains a statement relating to this, which clarifies the position. The danger (to which attention has been directed before) arises through the placing of combustible material, such as furnishings, near a radiant heater or similar appliance by somebody who is unaware that the appliance is later to be put into use by a time switch. I am particularly glad that the blame is thus officially transferred from the instrument to the user, as I consider that the time switch is one of the most useful, if not the only, form of automatic control which can be introduced into the home. It seems necessary for manufacturers and retailers of time switches to warn customers of this possibility.

* * *

The *Electrical Review* recently reported a claim by the American General Electric Co. that it could build boiling-water reactor power plants, up to 500 MW, which would produce electricity at a price comparable with "conventionally" produced power—in high-cost fuel areas. Mention was also made of the possibility of a 150-200 MW nuclear power plant in the Philippines which might be economically competitive with an oil-fired station of the same size. Now I read in the *Bulletin* of the Edison Electric Institute that the Pacific Gas & Electric Co. is applying for sanction to the erection of a 325 MW boiling-water reactor plant which, again, is expected to be economically competitive. I feel that there is a good deal of hypothesis about these claims and that proof, or disproof, can come only when such stations are actually in operation. We, in this country, have been more cautious in our expectations. It may be that when our nuclear stations actually get going the results will be better than we imagine: at least let us hope so.

* * *

Payment of electricity accounts by consumers in outlying districts frequently raises difficulties. In some cases banks have undertaken to deal with it but, as I have already remarked, there seems to be a growing reluctance on their part to continue this service without being well paid for it. A consumer writing to the *Leicester Mercury* considers that as the Post Office is a national concern it should deal with the payment of bills from the nationalised gas and electricity supply industries. The newspaper heads the letter "Post Office the Obvious Place to Pay Gas Bills." In view of the heterogeneous character of Post Office activities—dog, game and gun licences, pensions, banking, etc.—the addition of this to the staff's duties would not be incongruous but what would the staff have to say about it ?

* * *

The writer of a letter to the *Glasgow Herald* says:—

> "The recent census has revealed a drop of about 10 per cent in the population of the Hebridean island of North Uist, and an even more disastrous drop in that of the island of Barra. In contrast, in South Uist and Benbecula the population has risen. South Uist and Benbecula have electricity; the two other islands have not."

For this situation the North of Scotland Hydro-Electric Board is blamed. No doubt the Board has reasons for not extending the supply to the distressed islands and it can at least claim that it has done something for South Uist and Benbecula. But the letter does suggest that in the modern world where there is no electricity the people perish.

* * *

Just half a century ago there was a great electrical exhibition at Olympia in which all sections of the industry were represented; there were about 250 stands. The National Electrical Manufacturers' Association were the sponsors (just about the time that the title was changed to the present B.E.A.M.A.). Sir William Preece was the president and there was a strong committee of eminent electrical men, including Mr. T. E. Gatehouse of the *Electrical Review*. This journal gave considerable space to the show in several issues and the illustrations included in the text showed not only the varied nature of the exhibits but their substantial design and construction. Plenty of metal was used in those days. The reports show that there was some dissatisfaction at the paucity of the public attendance, although there was much of public interest—particularly on the domestic side. This was attributed largely to the lack of advertisement of the display and the consequent lack of support from the lay Press. Also it was a static show and the public likes working exhibits. Nevertheless, the *Review* later considered the exhibition to have been a success, although it agreed with many critics that a month of it was rather too much.

Electronic Computer Exhibition

PREVIEW OF THE DISPLAY AT OLYMPIA FROM 3rd TO 12th OCTOBER

A GOOD opportunity to become acquainted with computers, their peripheral equipment and data processing techniques is provided by the Electronic Computer Exhibition which is to be held from 3rd to 12th October at Olympia, London. The exhibition will be open daily from 10.30 a.m. to 7 p.m. except on the first day when it will commence at noon, while on Saturday, 7th October, it will close at 4 p.m. Fifty-three exhibitors are taking part in the exhibition, which is the second display of this type held in Britain. The first exhibition was held in 1958 and the forthcoming exhibition will emphasise developments in the last three years. This emphasis will be placed at least as strongly on new applications as on new equipment. Since 1958, British computer manufacturers have established themselves on an international level and it is hoped that the October exhibition will have a considerable export potential.

Units on display at the exhibition will fall into two broad categories, namely, standard production computers and computers specially designed for large-scale data processing, and scientific and research work. The main advances in computer techniques over the last three years have been the use of transistors, printed circuits, new storage devices and the simplification of programming. Although these technical advances are to be featured, the main aim of the exhibition is to show the layman how a complete data-processing system operates and how this will help him in his commercial activities.

Much of the equipment to be shown is designed for commercial applications, the majority being of a peripheral nature, concerned with the input and output of information from a computer rather than the computer itself. For example, new types of automatic printers are to be shown at the exhibition which can produce ordinary business documents at a rate of hundreds of lines per minute together with summaries and reports demanding day-to-day action by managements.

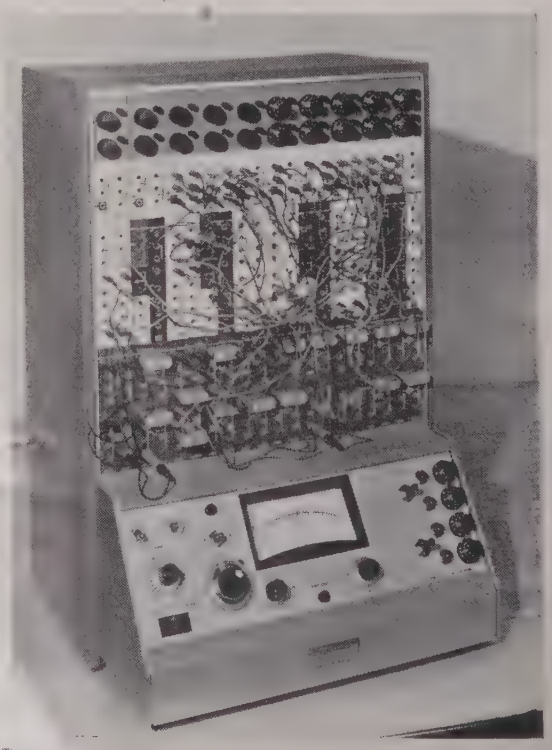
Emidec 1100 transistorised data processing system



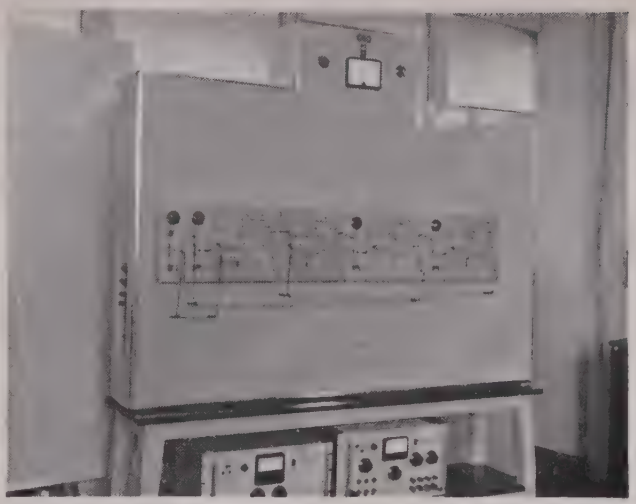
Although the exhibition is aimed mainly at the businessman and will show how computers can be advantageously employed by small- and medium-sized businesses, new applications of computers in scientific and industrial research will also be featured. The commercial emphasis will, however, be repeated in an electronic data-processing symposium, which will be held on 4th, 5th and 6th October. The speakers will cover all aspects of business applications of computers, and it is hoped that visiting managements will benefit from the practical first-hand experience already gathered in this country by commercial computer users.

Digital Computers

The majority of computer installations are of the digital type. The digital computer used for scientific purposes is designed to perform a large number of calculations on a relatively small quantity of data whereas the commercial machine processes vast amounts of input data of a statistical nature. Analogue computers are generally built for specialised applications since they are basically simulators. Unlike digital machines, which can only add or subtract, analogue computers perform complex mathematical operations, such as integration. However, their precision is somewhat limited. Hence, digital computers are used for accurate mathematical calculations and data processing, while the applications of analogue machines include network analysis and process control. For complex process



TRIO transistorised analogue desk computer to be shown by Electronic Associates, Ltd.





Above: International Computers and Tabulators type 1301 electronic data processing system

Left: The Short Brothers & Harland, Ltd., educational analogue computer

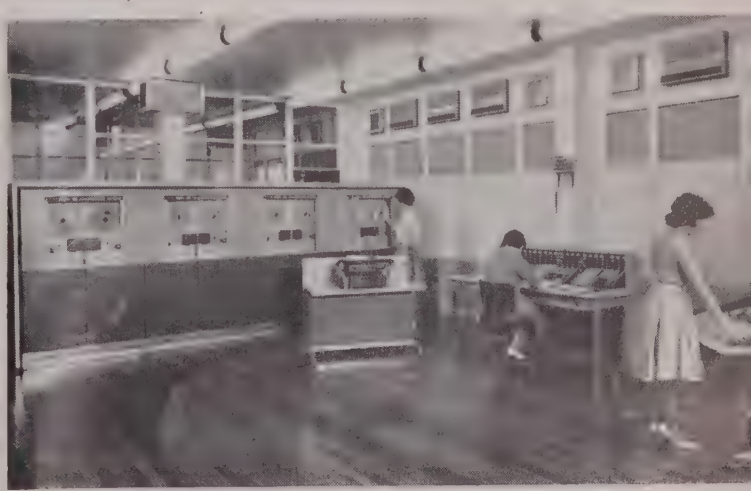
control applications a combined digital and analogue machine is required. The control scheme for the No. 2 set at West Thurrock will be of this combined type (see *Electrical Review*, 12th February last).

A scale model of what is claimed will be the most powerful digital computer in the world will be shown by Ferranti, Ltd. The first production model of this Atlas computer is now being installed at Manchester University and the control desk of this machine will also be on show. The details of the Atlas computer were given in the *Electrical Review* of 1st September. The design features include a supervisory system for regulating the flow of work through the machine, a " page address " system for more efficient utilisation of storage space, a new type of semi-permanent store for frequently-required data, and an adder with exceptionally fast carry-over. The Ferranti exhibits will also include an example of the small Sirius transistorised computer, a characteristic feature being its decimal notation and display. Scale models of the Ferranti Apollo and Orion computers will also be displayed.

The new transistorised Leo III, the fastest computer yet produced by Leo Computers, Ltd., will be shown in part at the exhibition. This computer can read and record on magnetic tape, printing results at more than 50,000 lines/hr. An important feature of the new model is the high-speed Anelex printer which will also be demonstrated. A complete Emidec 1100 transistor computer installation will be shown working on the E.M.I. Electronics, Ltd., stand. The installation will include a four-bay computing unit containing a 16,000-word drum, control console, power supply, four operational magnetic tape decks and a spare deck, five-hole paper tape punch and teleprinter, paper tape reader, card punch, card reader and a 600-line/min printer. Punched tape and cards for most programmes will be prepared in advance, but a small data preparation area will enable some data to be prepared on the stand. Visitors will thus be able to see a complete data processing system operating in a typical layout. Normally a computer is air conditioned, but as this is not possible at the exhibition, it is intended to install a cooling and filtering plant for the computing unit, the tape decks and the power unit.

A computer which can control up to 32 peripheral units simultaneously, the 1010 computer will be shown by the Electronic Apparatus Division of Associated Electrical Industries, Ltd. The computer has been designed so that it will work with any type of equipment and existing data processing systems can be assimilated, including programmes prepared for any other equipment. The 1010 computer was briefly described in our issue of 15th July, 1960. The latest version of the National-Elliott 803 general-purpose computer will be shown for the first time by Elliott Bros. (London), Ltd. Operating speeds have been increased considerably and a battery power supply has been built into the system to cushion the computer from the effects of fluctuations in mains voltage supplies and power failures. The latest innovation is a paper-tape station, designed to group together all paper input and output devices in a single unit. This speeds up the handling of perforated paper tape, while the immediate access ferrite-core store can now be backed up by up to four magnetic film storage units. Visitors to the Elliott stand will be able to see the 803 solving problems in the fields of civil engineering, aeronautical engineering, scientific statistics and operation research. A full-scale model of the new Elliott 503, a high-speed, inexpensive, medium-sized computer will also be shown.

The machine to be shown by Computer Engineering, Ltd., the CE102, has been designed primarily for use in technical colleges and research departments. These digital



The English Electric KDP10 data processing system. In the background is a section of the on-line magnetic tape units. The equipment shown includes the monitor printer, control console and high speed paper tape reader

machines are constructed from solid-state components, but costs have been reduced by using a comparatively inexpensive form of storage, basic input/output devices and simple logic. Although the use of a drum store means that the effective speed of the machine is slower than machines with a more expensive form of store, the operating speed is comparable with more expensive machines. The single-level memory store can hold 4,096 words of 32 digits each and the operating cycle is such as to give an addition time of 0·612 msec and a multiplication time of 10 msec. The price for this complete installation is £8,500.

A typical Stantec computing system, consisting of a basic transistorised Stantec computer of the latest type with various items of peripheral equipment, will be shown by Standard Telephones & Cables, Ltd. The Sperry Gyroscope Co., Ltd., will show a range of magnetic storage drums, while Ampex are to display complete ferrite core memory systems. The Components Division of Mullard, Ltd., will also display magnetic core storage units.

Data Transmission and Process Control

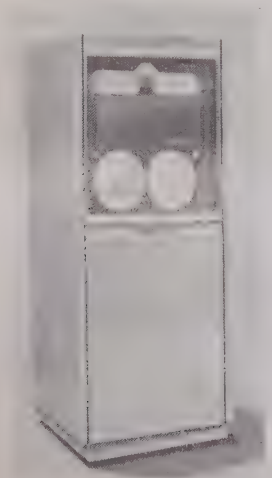
The Standard Telephones & Cables' stand will be connected by a leased G.P.O. line to a Stantec computer in Harlow, Essex, to demonstrate the transmission of data over the telephone network and remote data processing. This high-speed data transmission system was described in our issue of 25th August last, and at the exhibition it will employ a forward transmission speed of about 1,000 bauds and a return channel speed of 50 bauds. The slow-speed return channel will be used for convenience in feeding signals directly to a teleprinter without the need for a buffer store. A high-speed data link will also be demonstrated between the Automatic Telephone & Equipment, Ltd., and E.M.I. stands. The equipment will include five-hole paper tape input and output, with automatic error detection and correction. Another data link transmission system will be shown by Ferranti, Ltd. This system will be demonstrated by sending data from the Business Efficiency Exhibition to the Computer Exhibition for processing. The General Post Office will provide a display of communications systems suitable for data transmission.

A transistorised computer intended for the direct control of industrial processes will be shown operating on the Ferranti stand with a working model of a plant in the form of an animated display. This digital computer, the Argus, can operate on several different control programmes simultaneously. One of these machines has been ordered by the Central Electricity Generating Board and will work in conjunction with analogue devices at West Thurrock power station (see *Electrical Review*, 17th February). The Apollo computer, also shown by Ferranti, is a high-speed transistorised digital machine intended for automatic flow processes and designed to handle a large number of input and output channels simultaneously. Another system for industrial application is the Panellit 609 industrial information and computing system, the central processing unit of which is the Elliott 803 general-purpose computer. This system will be used at the exhibition to demonstrate a variety of routine monitoring and control operations associated with the efficient running of continuous manufacturing processes.

The special systems division of Honeywell Controls, Ltd., will demonstrate the application of computing techniques to industrial process control. The analogue equipment to be shown is specially designed for practical applications in connection with two-stage heat exchangers in the oil industry. Optimising is carried out by checking the effect of small disturbances on the process. Optimum performance is achieved in the minimum time.

The main feature of the Electronic Associates, Ltd., stand will be a PACE 231R high accuracy analogue computer. A transistorised 20-amplifier TR10 desk computer will also be shown. This machine is capable of solving one or two second-order differential equations, plus associated linear algebraic computation. It measures only 16in wide by 24in high by 15in deep. A new analogue computer developed to meet the present trend towards the introduction of computing techniques into the curricula of universities and technical colleges, will be shown by Short Brothers & Harland, Ltd. Although basically an educational instrument, the machine can be used for actual research. The standard machine has a capacity of eight amplifiers with provision for an extension of up to 15 amplifiers. Setting up a problem automatically displays a visual presentation of the circuit diagram involved. Another analogue computer particularly suitable for educational establishments will be shown by the Solartron Electronic Group, Ltd.

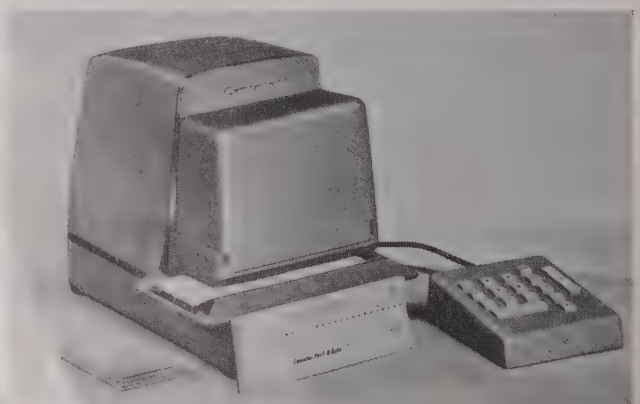
The International Computers & Tabulators, Ltd., 1301 data processing system, to be shown for the first time, has a high processing speed combined with large capacity.



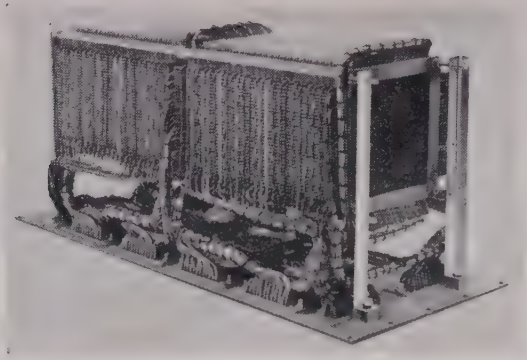
Left: Decca Radar's new digital computer magnetic tape transport type 4,000

Below: An Elliott high speed paper tape reader to be shown by Associated Automation, Ltd.





A Perf-O-Writer will be displayed by Original Document Processing, Ltd. With this unit, figures perforated into the documents are legible to both the human eye and to the data processing machines

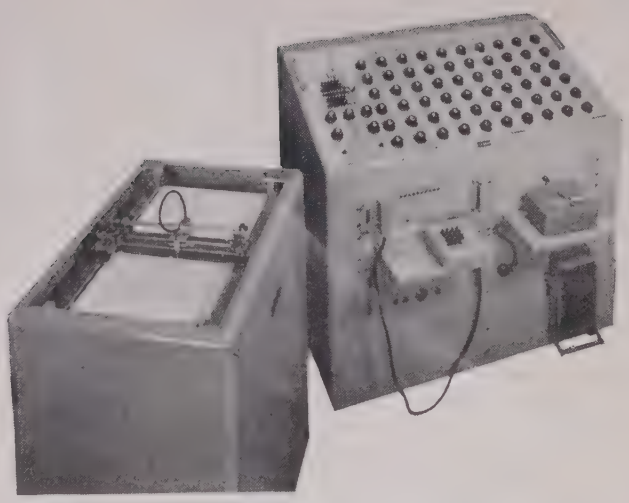


A 4,096 word 50 plane Plessey memory store to work with a cycle time of less than 2 μsec

The system has been specially designed to permit development and expansion along with the growth of the organisation. The I.C.T. 1301 operates with punched card and/or magnetic tape input and output as well as printed output at 600 lines/min. The rate of programme controlled punched card input is 600 cards/min and up to eight magnetic tape decks can be incorporated in the system. An immediate access core store has a basic capacity of 400 words, each of 12 digits capable of being expanded to 2,000 words in multiples of 400 words. This is backed by a drum store holding 12,000 words of 12 digits and able to be extended up to 96,000 words in multiples of 12,000. The fully transistorised central computer operates at 1,000,000 c/s. Decimal or sterling addition and subtraction are executed in 21 μsec, and, for multiplication, the average is 170 μsec per multiplier digit.

Two data processing systems will be shown by I.B.M. United Kingdom, Ltd. The I.B.M. 1620 system employs a stored programme computer and is suitable for use with off-line listing of output cards, for many commercial applications, although it is intended primarily for scientific and engineering work. The other system to be demonstrated will be the I.B.M. 1410 Ramac data processing system with high-speed tape units. This system, which includes a transistorised stored programme computer, has a total capacity of 20 magnetic tape units, each with read/write speeds of up to 62,500 characters/sec and up to five disc storage units with a maximum capacity of 100 million alphanumeric characters. English Electric will be showing for the first time their new KDP10 and KDF9 data processing systems. The KDP10, a flexible system designed to expand with the needs of growing concerns, was described in last week's issue. The KDF9 is a general-purpose system with a high operating speed and is designed for general data processing applications and very fast large-scale calculations. Magnetic tape units, a card reader and an automatic printer, all interchangeable units for KDP10 and KDF9, will be shown. Also exhibited will be a KDP10 console, high-speed store and tape storage unit, a KDF9 high-speed reader and the new Datapac computing system.

The 300 DP series of business data processing equipment will be shown for the first time in Britain in computer form by De La Rue Bull Machines, Ltd. The Gamma 60 data processing system will also be represented on this stand in the form of a scale model. The National Cash Register Co., Ltd., will feature a display of their new 315 electronic data processing system. This system



Automatic graph plotting equipment to be exhibited by Dobbie McInnes (Electronics), Ltd.

employs a memory system, called "Cram," which stores information on special magnetic cards and provides facilities for both random and sequential processing. The cards are held in interchangeable cartridges, each of which stores over five million alphanumeric characters. This company will also show their new business data processing system, the NCR390. In this system, the built-in memory consists of a series of narrow magnetic strips superimposed on the back of a card. Up to 200 characters of information can be stored on each card. The central processor is transistorised and has a magnetic core memory for storing programme instructions, accumulated totals and other data. Information can be fed into the 390 by direct entry on the console's keyboard, by punched paper tape, by punched cards, and by the magnetically-encoded ledger cards.

Peripheral Equipment

A unit which enables cards to be punched automatically as a result of recording data in respect of an operation or transaction, will be shown for the first time by Account-Tokens, Ltd. This equipment, known as Print-A-Punch, employs a plastic card. Data, such as account number, part number, or operator number are embossed and punched into the plastic plate. Data on these plastic plates can be punched into cards ensuring an accurate recording without risk of operator errors. Variable data can be set up on a slide keyboard and recorded into the same punched card. Thus, the machine will produce punched cards ready for computer input at the point where such data are created. Three new additions to the range of punched card and tape readers will be shown by Associated Automation, Ltd. The B47 stepping card reader will be demonstrated operating an Addo-X add/listing machine with a three-shuttle carriage and duplex registers. This reader can also be used for machine tool control. The D4/82 medium-speed tape reader to be shown, operates up to a speed of 200 characters/sec. This compact, low-priced unit is suitable for very small computer or data transmission applications as well as for machine tool control. The other new item to be shown by this company is the B46 complete computer card reader station which has a loading capacity of 2,000 cards.

A new range of equipment designed to facilitate the

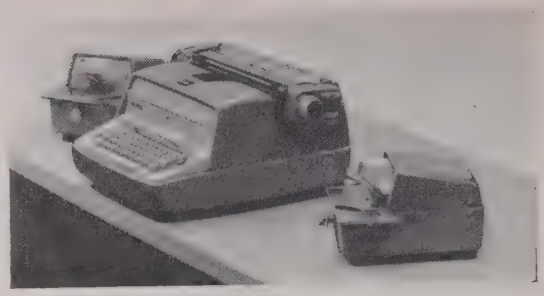
collection of data from any number of points of origin to a data processing centre, will be shown by Friden, Ltd. This Collectadata system consists of two basic units, a transmitter and a receiver. Two transmitters are offered, one of which takes punched tape or edge-punched cards and the other tabulating cards. Any number of transmitters can be attached to one receiver and to ensure a free flow of information from each transmitter in turn, a "line busy" indicator is fitted. This will then hold transmissions until the line is cleared. The system has many applications in industry, one of the most important being production control. This application will be demonstrated using two tabulating cards as input. The first will have the employee details and the second the job details. The Friden punched tape code convertor is to be shown for the first time. This consists of a paper tape reader and a punch housed in a single unit, and capable of converting any 5-, 6-, 7- or 8-track code into any other 5-, 6-, 7- or 8-track code. The speed of the code convertor is 1,180 codes per minute. The various types of peripheral equipment to be demonstrated on the Addo, Ltd., stand include tape punching, card punching, card reading, data collection, data logging and strip printers.

Until recently, the users of computers and other electronic data processing equipment have had to accept, as an inevitable penalty, that large volumes of input data, initiated in a humanly legible form, must be converted to a machine language by an operator. Naturally, the work done by one operator must be verified by another before the data goes to the computer. This problem can be solved by using data which are both legible to the human eye and are also readable by a machine. The Perf-O-Data system, to be exhibited by Original Document Processing, Ltd., provides one example of the trend towards legible data. Legible figures are perforated in the original documents and when required as an input to a computer, these same figures are photo-electrically read by a Perf-O-Reader coupled to a tape or card punch. Data from 150 original documents, each with 15 digits, can be transferred to paper tape each minute.

Magnetic Tape Equipment

A digital magnetic tape handling unit, the TM2, will be featured by Ampex (Great Britain), Ltd. It has a tape speed of up to 150in/sec with 1·5 msec start/stop times. Magnetic Products, Ltd., an associate company of Honeywell Controls, will demonstrate a digital magnetic tape unit which has the ability of the flux sensitive read head to check characters whilst it is stationary. The close spacing of the read and write heads enables a character to be checked before the next one is written. If this checking indicates that the character is incorrect, then since this character is held in the input memory, it can be rewritten one "bit" later. The machine combines a fast start/stop mechanism with a wide variety of input and output speeds.

A new digital magnetic tape transport will be shown by Decca Radar, Ltd. This, type 4000, has been designed for operation with high-speed computers. Less than 2 msec is required from the receipt of the start signal and until the tape is running and at a tape speed of 150in/sec. The length of tape lost from use during starting and stopping is less than 0·3in. Dual write/read heads are available at 0·39in spacing, while the standard data rates are 45,000, 90,000 and 180,000 characters/sec. The latter speed is achieved by an interlaced track arrangement. The unit incorporates pneumatic drive of the tape. The Data Recording Instruments Co., Ltd., will also exhibit their latest high-speed digital magnetic tape transport. This equipment has a start/stop time of 2 msec. This company will also be showing for the first time, a complete equipment for the testing of magnetic tapes together with a full range of recording heads. Recording heads will also be shown by the M.S.S. Recording Co., Ltd. The flux-sensitive heads shown depend only on the m.m.f. applied across the gap and are thus quite independent of the tape speed. Among the exhibits of the Plessey Electronic and Equipment Group will be a new fast start/stop computer tape unit, both standard and special-purpose transistor circuit ferrite core memory systems, a new large capacity magnetic store, data transmission equipment and loop error detection equipment.



Block & Anderson's Typetronic 2215 automatic writing and data processing system

Graph Plotters

Equipment for automatic graph plotting from punched cards or paper tape representing the output of a computer, will be shown by Dobbie McInnes (Electronics), Ltd. One demonstration will show the conversion of machine drawings to digital information for machine tool control. Benson-Lehner (G.B.), Ltd., will exhibit two automatic graph plotters and an "Oscar" system for transferring data from strip chart records to punched cards, punched tape or an electric typewriter. With the "Oscar" system, an operator can measure successive displacements of each trace, relative to a chosen datum, to a chosen scale and corrected for non-linearities in the original records. This is achieved by placing two cursors over each data point of interest and pressing a read-out button. The data then flows out, digitally, to an electric typewriter or a card punch.

Automatic Typewriters

A business document writing system consisting of an electric typewriter and electronic components which can be programmed for any automatic typing operation will be shown by Block & Anderson, Ltd. The input to the Typetronic 2215 is by edge-punched cards or punched tape. The machine will automatically type at more than 100 words/min, eliminating human error and costly manual repetitive writing. The Typetronic can, itself, produce edge-punched cards or punched tape for future automatic processing. Variable data can be entered on the typewriter by the operator. The typewriter will stop automatically at the correct position for entry. This company will also show an electronic sterling calculator, the

Bandatronic, which can multiply, calculate discounts, add and subtract, and type totals. It can calculate in sterling for as many as six input/output typewriters.

A wide range of accounting and typewriting machines with built-in tape punches will be displayed by British Olivetti, Ltd. Creed & Co., Ltd., will show their new Creedomat which comprises an I.B.M. electric typewriter with interconnected Creed tape punch and reader units, complete with a metal desk accommodating transistorised circuitry and pushbutton controls. The Creedomat provides for the code punching of paper tape as a by-product of typing original documents. It also automatically interprets punched paper tape and edge-punched cards into typed copy at a speed of 100 words/min.

Miscellaneous Equipment

A new, self-contained, electro-mechanical data processing system will be shown by Creed & Co., Ltd. Under the control of a single operator, the system records sales orders via a keyboard or a pushbutton input unit, automatically retrieves stored data from a 60 m.p.h. punched paper tape memory, performs price calculations and selectively prints a variety of documents needed for manufacture, delivery and invoicing at multiple local or remote locations. In addition, it punches into paper tape accounting and statistical details for automatic processing on punched card equipment or an electronic computer. The electronics department of Rank Precision Instruments, Ltd., will show their Xeronic electronic computer output printer. The signals from the computer are written by a beam of electrons on a cathode-ray tube screen and this visual image is then copied by xerography on to a paper at the rate of 40ft/min. There are no high-speed mechanical parts. It will print up to 4,700 characters/sec. On the Hawker-Siddeley Group, Ltd., stand Armstrong Whitworth Equipment will show a high-speed eight-bit analogue-to-digital convertor which can perform up to 55,000 conversions/sec. The principal exhibit on the Southern Instruments, Ltd., stand will be a new 12-channel compact motorised trace reader which will be demonstrated in association with other electronic equipment covering the sequence of events from transducer to computer input.

Multi-copy continuous forms and form-feeding equipment harnessed to high-speed printers will be demonstrated by Lamson Paragon, Ltd. A demonstration will show Paragon continuous stationery being processed on a Creed 75 teleprinter fitted with Lawson Paragon Formaliner continuous form feed. Other systems for automatic paper handling designed to speed the flow of continuous forms through offices and reduce paper work costs will also be demonstrated by James Wilkes, Ltd. A complete range of continuous and carbonised forms for use as source documents and output documents for computer systems, will be displayed by Fanfold, Ltd. Office equipment for the storage, filing and transporting of punched cards, paper tapes and magnetic tapes will be shown by Jenkins Fidgeon, Ltd., while various accessories for punched card and computer installations will appear on the stand of Punched Card Accessories, Ltd.

B.S.I. ANNUAL REPORT

In the year 1960-61 covered by the annual report presented to the British Standards Institution at its annual general meeting held last Wednesday there was again a general rise in the level of the Institution's activities measured by the publication of standards, draft standards circulated for comment, distribution and sale of publications and national and international committee meetings. There were 301 British Standards published for this year, 352 drafts for comment were issued and sales of standards numbered 1,158,000. The B.S.I. has taken part in 80 meetings of the I.S.O., I.E.C. and C.E.E. committees, and several new committees have been established during the year. The number of firms licensed to use the kite mark increased by 51, bringing the total to 1,498. The number of standards under which the mark is now used has risen to 185.

The British Electrical Approvals Board has been formally constituted. Its General Council acts as an advisory body and has held its first meeting. Manufacturers of the first group of appliances to be approved (radiant fires, kettles and vacuum cleaners) have received their approval certificates. The Board is constituted by the British Electrical and Allied Manufacturers' Association, the Electrical Development Association (representing the supply industry), the Electrical Contractors' Association and the Electrical Wholesalers' Federation. Approval of appliances will be based on the relevant British Standards which are being issued under a single number, B.S. 3456 with a series of parts, enabling the approval mark to quote a single British Standard number.

Two series of meetings of the International Commission on Rules for the Approval of Electrical Equipment (C.E.E.) were held. Agreement was reached on the identification of the earthing cores of flexible cords for portable electrical appliances. A green/yellow colour combination was accepted by all countries either as an alternative to their existing identification colour for the earth wire, or as their sole national standard. The situation is not, however, resolved with regard to the colours used to distinguish the live and neutral cores.

Dealing with finance, the report states that during the summer of 1960 it was decided that changes in the terms of subscribing membership were necessary, including raising the minimum subscriptions. Greater support from industry for B.S.I. is, however, becoming urgent. In the year 1960-61, though the actual number of subscribing members declined by 4 per cent in consequence of the raising of the minimum subscription level, the total of subscriptions has increased by about 7½ per cent and expenditure was covered by a small margin. Anxiety must be felt for the future and for the next two years in particular in which the Government says its grant should remain stable.

Work on the revision of British Standard G.100 for aircraft electrical equipment is now in its final stages and Parts 1 and 2 should be available soon. These two Parts,

with Part 3 which is already published, will comprise British Standard 2G.100. It is proposed that in future all British Standards for aircraft electrical equipment shall be published in the " G " series. An important addition to the series soon to be published is the British Standard for crimped joints (non-insulated) for general purpose electrical cables for aircraft.

Work carried out by the Electrical Engineering Division included completing the revision of B.S. 2004, " P.v.c.-Insulated Cables and Flexible Cords." In so doing, it was necessary to decide on the extent to which the British Standards for electric cables should be aligned with the Wiring Regulations published by the Institution of Electrical Engineers. The principal point at issue was the range of sizes over which aluminium conductors were to be recognised as alternatives to copper conductors. It was eventually decided to recognise the whole range of aluminium conductors standardised in B.S. 2791 (i.e. for all cables but not for flexible cords). Agreement has been reached on a new system of voltage designation for electric cables.

Work has started on a standard for polyphase plugs and socket-outlets for industrial power supplies, which is based on the recently issued C.E.E. Publication 17, " Plugs, Socket-outlets and Couplers for Industrial Purposes." The work on the revision and amalgamation of the graphical symbols for general electrical engineering and telecommunications contained in B.S. 108 and B.S. 530 has continued, but is inevitably slow as account has to be taken of the symbols currently under discussion by the I.E.C. That part of B.S. 698, " Papers for Electrical Purposes," dealing with paper used in the manufacture of power capacitors, has been reviewed to see whether the requirements for capacitor tissue can be improved. The increased application of intrinsic safety techniques in surface industries (as opposed to coal mining) has led to the need for extensions to B.S. 1259, " Intrinsically-Safe Circuits and Apparatus."

Proposals for a new standard dealing with electrical protective systems have been under consideration. It is intended that it should give comprehensive information on the performance and tests of complete electrical protective systems. No new conductor coverings are at present being considered for standardisation, but the work of revising the existing standards is progressing steadily. An attempt is being made to devise a system of colour coding for reels. A comprehensive revision of B.S. 81, " Instrument Transformers," and B.S. 2046, " Protective Transformers," is being undertaken, capacitor voltage devices being included in the standard for voltage transformers. The revision of B.S. 923, " Impulse Voltage Testing," will be based on I.E.C. recommendations which are at present also being revised. Effort is now being concentrated on the dimensional standardisation of insulator fittings. The revision of B.S. 2754, " Memorandum on the Design of Electrical Apparatus Having Double Insulation," was necessary to take account of requirements for double insulation introduced in recent British Standards, as well as in C.E.E. publications. Details are given of recommended creepage distances and clearances and tests applicable to both all-insulated and double-insulated equipment. An introductory section has also been included giving a general description of the features of double-insulated and all-insulated equipment in relation to the other types of protection against electric shock which are permitted by Regulation 401 of the Wiring Regulations.

The Illumination Division is reviewing a number of new terms and definitions in preparation for a revision of B.S. 233, " Terms Used in Illumination and Photometry." A new classification of roads into two main groups, A and B, with various sub-groups has been agreed for the revision of C.P. 1004, " Street Lighting." Other groups will cover lighting for town and city centres, bridges and flyovers, tunnels and underpasses, roundabouts and complex junctions. A draft specification for lighting fittings for examination purposes in hospitals is in preparation and a working voltage of 25 V will be specified. Full specifications for sodium and mercury discharge lamps are now in preparation and will give details of tests and the selection of samples for test. Tungsten filament lamps for miscellaneous purposes are dealt with in B.S. 555 and this specification is under revision to deal more adequately with methods of test and sample selection. A schedule of tungsten filament lamps with internally silvered bulbs is under consideration. B.S. 950, " Artificial Daylight Fittings for Colour Matching," is under revision. Requirements for colour matching will be dealt with initially, and colour rendering will be considered later.

The Instruments Division has completed a set of reference tables for copper *v.* constantan thermocouples and other series of tables for iron *v.* constantan thermocouples are well advanced.

A draft British Standard for a symbol to denote the actual or potential presence of ionising radiation, based on a proposal shortly to be circulated to I.S.O./T.C. 85 as a draft I.S.O. Recommendation, has been circulated for general comment by the Nuclear Engineering Division. Data on shielding is being compiled for publication in a British Standard to facilitate the calculation of exposure dose rate and exposure dose received from sources of radioactivity shielded with various materials.

Codes of Practice

The Committee for Electrical Engineering of the Codes of Practice Division proposes to include certain clauses on floor warming, when these are available, in the draft code on electrical installations. Information is still awaited regarding current ratings for cables supplying electric motors, but is expected in the near future and this will enable amendments to C.P. 321.102 to be settled and a first draft to be completed. Following the general circulation of the draft code on earthing, the comments received were considered by the Electrical Research Association Committee on Earthing and a new draft was prepared. It was considered that while the clauses dealing with testing earth leakage circuit-breakers were a statement of desirable practice, they did not necessarily reflect widely-accepted current practice and the views of a number of Electricity Boards and of two or three leading electrical contractors are being sought. A draft standard for dust-tight electrical equipment is now available and the drafting of the code for the installation and maintenance of this equipment will soon begin.

The report concludes with details of the work of standards committees outside divisional councils, miscellaneous technical committees, advisory committees and international activities.

New Equipment for Public Lighting Engineers

A.P.L.E. EXHIBITION AT SCARBOROUGH



Only two Philips 2,000 W mercury fluorescent lamps were needed to illuminate this London building site

AN important attraction for delegates to the annual conference of the Association of Public Lighting Engineers is the comprehensive display of lamps, lanterns, lamp columns, and erection and maintenance equipment put on by manufacturers. The following items are among those recently introduced and are being shown for the first time.

Sectionalised phosphor coatings will enable visitors to the stand of Philips Electrical, Ltd., to examine the special internal construction of the company's range of mercury fluorescent lamps which now extends from 50 W to 2,000 W, with and without internal reflectors. Two of the new 2,000 W lamps were used in a trial installation at the Tersons building site at the Elephant and Castle, London. Mounted 6ft apart and 80ft above ground in conventional area floodlighting fittings they provided 5 lm/sq ft at a point 12ft from the base of the pole and 2 lm/sq ft at a point 160ft away. Philips have also introduced a range of extra-high quality capacitors for street lighting.

The range of power factor correction capacitors for street lighting made by the Telephone Manufacturing Co., Ltd., has recently been re-designed to reduce the height and standardise the cross-sections to 3in by 2in so that the capacitors can be installed in the new slimmer columns. A novel fixing bracket enables the capacitors to be fixed in virtually any position.

A modified version of their "Widerlite" fitting has been produced by Holophane, Ltd., for use with a 50 W MBF/U lamp. The accessories accommodated include a 50 W elongated choke, specially designed for integral mounting with an 8 μF capacitor, and internal wiring to a terminal block mounted behind a heat deflector barrier plate.

This arrangement makes a neat, compact fitting suitable for mounting on ceilings where ambient temperatures do not exceed 25°C and for wall mounting up to 35°C. The "Widerlite" is thus suitable for lighting boiler houses in power stations, retort houses in gasworks, etc., but it can also be used for the lighting of access balconies in blocks of flats, municipal buildings, passages and basements.

A cast aluminium alloy lighting fitting introduced by Victor Products (Wallsend), Ltd., houses two 2ft 20 W tubular fluorescent lamps and it can be supplied with a flush-front frame or for free, weatherproof, suspension.

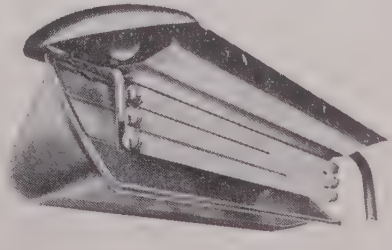
Right: Novel fixing bracket on the T.M.C. power-factor correction capacitor



Below: Flush cast aluminium alloy fitting for two 2ft tubular fluorescent lamps. (Victor Products (Wallsend), Ltd.)



Below: A new reflector version of the A.E.I. "Kington" lantern for three 80 W fluorescent tubes

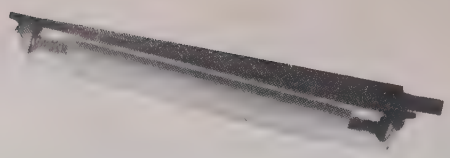




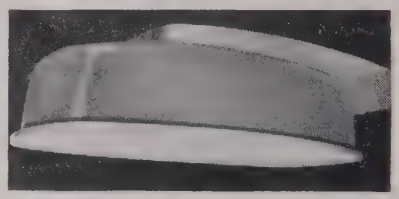
Holophane "Widerlite" fluorescent bulkhead fitting



A. C. Ford post-top lantern



G.E.C. lantern having a true-cut-off in accordance with the B.S. Code of Practice



Revo "Hyperion" fluorescent lantern

The overall dimensions of the front frame are 27¾in by 8½in and for recessing a hole 27$\frac{7}{16}$in by 8$\frac{3}{16}$in and 4in deep is required. A quick-start circuit is provided. The reflector is of vitreous enamelled sheet steel and the diffuser is of ¼in opal Perspex.

A further application of the 200 W linear sodium lamp has been created by the introduction by the A.E.I. Lamp & Lighting Co., Ltd., of the M50 floodlight to provide a supplement to normal street lighting during periods of poor visibility at accident black spots. Two new "Amber" lanterns introduced this year are a side-entry version of the "Baby Amber" for Group B roads using a 45/60 W sodium lamp and a side-entry enclosed lantern for a 140 W sodium lamp for Group A roads. The new refractor version of the "Kington" lantern for three 80 W fluorescent lamps is illustrated.

A side-entry mounting main road lantern, the "Hyperion," has been designed by the Revo Electric Co., Ltd., for use with two 3ft 30 W fluorescent lamps. The body is cast in high quality silicon aluminium alloy and the optical system consists of prismatic refractor panels cemented to a Perspex bowl having smooth interior and exterior surfaces. A satin finished anodised aluminium internal reflector can be provided if required. The lantern can also be used with a 200 W sodium lamp of the linear or integral type.

The "Bromley" post-top lantern, which is for side road lighting using 125 W MBF/U lamps, has a cast-iron base and the canopy is a silicon aluminium alloy casting. The optical system consists of a moulded Perspex bowl with Perspex prismatic refractor plates cemented to its inner surface. The "Helion" post-top lantern is designed for main road lighting using three 140 W sodium lamps. The canopy consists of a 4ft diameter copper spinning galvanised, [illegible] and stove enamelled in [illegible] enclosed by an opal Perspex bowl.

Typical of the newest developments by the General Electric Co., Ltd., are lanterns for main road lighting using colour corrected mercury lamps. One of these is a lantern having a true cut-off distribution in accordance with the B.S. Code of Practice. Another houses a line of three colour corrected mercury lamps. A new and attractive post-top lantern for high mounting positions and housing mercury lamps will also be shown. New approaches to the problem of providing high levels of illumination in sodium street lighting installations are apparent in two high efficiency lanterns in both cut-off and non-cut-off versions, using the 200 W linear sodium lamp. Lanterns for side road lighting include one for two 2ft 40 W fluorescent tubes, two lanterns for 60 W sodium lamps, in both cut-off and aero-screened forms, and an attractive post-top lantern for tungsten filament or mercury lamps.

A fluorescent lantern specially designed to take two Philips 80 W, 5ft "Reflectalite" lamps is one of several lanterns recently introduced by Eleco, Ltd. The lamps are mounted horizontally and angled to obtain the maximum distribution of light. The high-power-factor quick-start polyester filled ballasts are fitted inside the die-cast aluminium canopy, and the one-piece clear Perspex bowl is fully gasketed and attached by stainless steel hinges and quick action toggles.

To facilitate the conversion of existing columns with no





Left: Composite photograph of the new lighting column, with Atlas Lighting lantern, being supplied by Stewarts & Lloyds for the Park Lane improvement scheme. Right: A 30ft spun concrete lighting column by Stanton & Staveley

provision for the control gear in the base, Eleco have produced a version of their "Silver Ray" lantern which contains the control gear and capacitor in an extension to the hood. The "Sunray" range has been extended with two lanterns giving cut-off to the B.S. Code of Practice. They are constructed of cast aluminium with Perspex covers. One is designed for 60 or 45 W lamps and the other for 85 or 140 W lamps.

Atlas Lighting, Ltd., will be showing their new "Alpha Seven" Group A lantern which uses a 250 or 400 W colour corrected mercury lamp. It has a one-piece cast light alloy body which combines the end support and the "Opticell" into one unit with a smooth outer glass refractor bowl hinged to give easy access to the interior. The internally moulded prisms of the refractor bowl are designed to give a concentrated beam of high intensity at peak level.

The "Alpha Five" lantern has been designed for use with a 200 W linear sodium lamp and incorporates the company's reflector/refractor method of light control. It provides a medium angle beam distribution with a sharp run back from the peak intensity to reduce glare to a minimum.

A. C. Ford, Ltd., have introduced two lanterns of simple and robust construction which can accommodate all types of lamps used in Class B lighting, with the exception of tubular fluorescent. All exterior metal is of silicon aluminium and the enclosing envelope is of opal Perspex, seated against rubber gaskets top and bottom. Access to the interior is gained by the removal of the canopy which is retained by a large serrated hand nut and can be supplied for any spigot mounting. An improved version of the A.C.356 lantern, suitable for 100-200 W tungsten and 85-125 W mercury vapour lamps, is also shown.

What is claimed to be the only street lighting column manufactured entirely from polyester resin-bonded glass-fibre has also been developed by this company. The column is a single 16ft tube tapering from 9in diameter at the base to 2¾in diameter at the top. The surface is smooth, and since the colour is inherent in manufacture and fast throughout, the column never requires painting. Cable access is by means of a conventional slot in the base and the lamp control gear is housed in a compartment behind a 20in by 5in door on a 24in by 5in base board. This arrangement enables any combination of Class B control gear and cable termination to be adequately accommodated. Bracket arms, for top or side entry lanterns for 15ft mounting height, can be supplied made from steel tubing and then plastic sprayed in a colour to match the column. The overall weight of the unit is only 45 lb.

The G.E.C. are also showing a reinforced plastic column in the outside display.

The first street lighting installation in Great Britain with lamps mounted at 40ft will be in the Park Lane, London, improvement scheme. Stewarts & Lloyds, Ltd., have been awarded, through Atlas Lighting, Ltd., a contract for the supply of the 104 tubular steel lighting columns with a 40ft mounting height and a column and lantern will be included in the outdoor display. Column and lantern were specially designed to meet the requirements of the London County Council and the Westminster City Council. Considering the mounting height the columns are extremely slender, having an outside diameter of 8⅝in at the base, reducing to 3½in at the top. The bracket arms have an outreach of 8ft 6in.

The range of pre-stressed spun concrete lighting columns manufactured by Stanton & Staveley Sales, Ltd., has been further extended by the inclusion of units for 30ft and 35ft mounting heights. They are supplied with concrete brackets and are approved by the C.O.I.D.

IODINE LAMPS

A MINIATURE iodine-filled filament lamp is now being manufactured by the Osram Lamp Division of the G.E.C., East Lane, Wembley, Middx. First applications of the lamp are for floodlighting or for use in some form of projection system. A demonstration of the new lamp has been installed at Luton Airport in a glide approach indicator system. Here 96 lamps of 6·6 A 200 W rating are in use. It is claimed that they give 15 per cent more light than the lamps in standard use on airfields and have 2½ times the life. This type is now on sale and, although its price is greater than that of the corresponding conventional lamp, it is expected to show a considerable saving over a period.

The second form of iodine lamp in development is a tubular filament lamp of 500, 1,000 and 1,500 W for floodlighting and for industrial and arena lighting. This will be available shortly and is designed to give 15 per cent more light than its conventional equivalent. The 1,500 W lamp is only 9in long and ⅜in in diameter. A third form of iodine lamp is being developed, a 100 W projector lamp intended for home 8 mm ciné-projectors.

The principle of the iodine lamp is not new, but the technology which has made it a commercial proposition has only been developed in the last few years. So far it has been successfully used only in quartz bulbs with a tungsten filament. This excludes it at present from competition in the field of mass-produced low wattage bulbs. The principle is based on the regenerative cyclic reaction set up by the addition of a trace of iodine vapour to the argon filling. This continuously removes deposits of evaporated tungsten from the bulb wall and returns it to the filament. It has thus become possible to make high power filament lamps in very small sizes without the blackening which would occur in normal lamps.

Another lamp is the iodine quartz lamp—measuring only 75 mm overall, with a diameter of 12·5 mm, and rated at 118 V and 625 W—announced by Atlas Lighting, Ltd., Thorn House, Upper St. Martin's Lane, London, W.C.2. The lamp consists of a slender quartz tube containing a linear tungsten filament operating at very high temperatures, with a gas filling of argon and iodine. It is claimed that the life of the bulb, twice that of a 500 W reflector photoflood, is considerably extended because the presence of iodine helps to retard evaporation of the filament and that the light output, 21,000 lumens, remains practically constant throughout life because the tube wall stays clean. The lamp has been primarily designed for use in compact lighting units for cinematographic and photographic floodlighting and is suitable for use with both colour (type "A") and monochrome film. The list price is 59s 6d.



The three iodine lamps being developed by the Osram Lamp Division of the G.E.C.

NEW ELECTRICAL EQUIPMENT

GAS-FILLED TRANSFORMERS

A range of gas-filled, sealed dry-type transformers marketed by the INTERNATIONAL GENERAL ELECTRIC CO. OF NEW YORK, LTD., 296, High Holborn, London, W.1, utilises C_3F_8 (perfluoropropane) as an insulating/cooling medium. The gas is non-inflammable, non-explosive and non-toxic and will not decompose even under extreme operating temperatures. Because of its superior insulating properties, impulse levels of the new transformers are higher than those of previous nitrogen-filled units. The transformers are available in ratings of 300 kVA and above, and 15 kV and below.

PRIMARY TRANSFORMER

The "Primatran" portable toroidal primary transformer being manufactured by FARNELL INSTRUMENTS, LTD., Light Industrial Estate, York Road, Wetherby, Yorkshire, is basically a primary winding, mechanically designed so that a secondary winding or a number of secondary windings can easily be added to provide any voltage required by the user. It operates from an input of 200/250 V, 50/60 c/s, single-phase, and has an output rating of 250 VA continuous and 350 VA intermittent. The output voltage can be stepped up or down as required by changing the number of secondary winding turns. More than one secondary can be used simultaneously, e.g. two outputs of 6 V at 2 A and 10 V at 4 A. The unit can be used for demonstration and theoretical work on the transformer principle and, since it can also be used as a current transformer, for demonstration and practical work on the theory of such transformers. When used as a current transformer, it has an accuracy to Class C, B.S. 81/1936, at 15 VA. The overall size is $7\frac{1}{2}$in high, $6\frac{3}{8}$in wide with a base $6\frac{3}{8}$in by $3\frac{9}{16}$in. It weighs 6 lb and costs £8 5s.

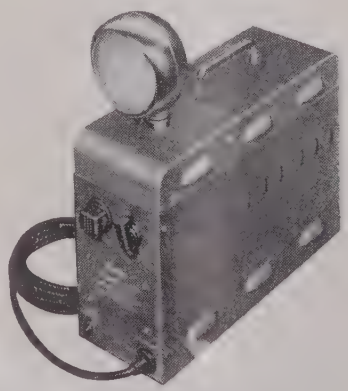


Farnell Instruments primary transformer

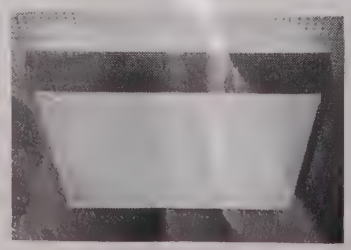
EMERGENCY LIGHTING EQUIPMENT

A portable self-contained unit which will provide automatic emergency lighting immediately on mains failure has been introduced by CHLORIDE BATTERIES, LTD., Exide Works, Clifton Junction, Manchester. Known as the Exide Keepalite "P," the equipment is designed for use in places where permanent emergency lighting schemes are impracticable; it can be plugged into any power point and no special wiring is required. The unit is housed in a sheet steel container, the battery and charger being in separate compartments, and a swivel-mounted lamp is fitted on top. An on/off switch is mounted on the front and the unit is normally left connected to the mains supply, a small neon indicator lamp showing that this supply is "healthy." Normally fitted with a 36 W bulb to give $3\frac{1}{2}$ hr emergency light, the equipment will provide $1\frac{1}{2}$ hr stand-by lighting when two lamps not exceeding a total of 60 W are used. It is suitable for use on 200/250 V 40/60 c/s mains.

The battery, designed for use on trickle charge, comprises a 12 V assembly of two 6 V units, each with a capacity of 12·5 Ah at the 10 hr rate. At average room temperature topping up is necessary only two or three times per year. The equipment weighs 30 lb complete and measures $4\frac{3}{4}$in wide by 13in long by $14\frac{3}{4}$in high (including lamp). The price is £25 10s.



Chloride Batteries portable emergency lighting equipment



Merchant Adventurers' louvred fluorescent fitting

LOUVRED FLUORESCENT FITTINGS

A range of louvred fluorescent fittings, which are available as individual units or can be formed into continuous runs, has been introduced by MERCHANT ADVENTURERS OF LONDON, LTD., Hampton Road West, Hanworth, Feltham, Middlesex. The metalwork of extruded aluminium cuts off the side light while translucent white opal louvres or reeded "Perspex" panels diffuse the light below. This series is designed for high levels of illumination in commercial interiors and the fittings can accommodate two, three or four 8ft 125 W fluorescent tubes. Other types are available for 2ft, 4ft or 5ft tubes.

WELDING IGNITRONS

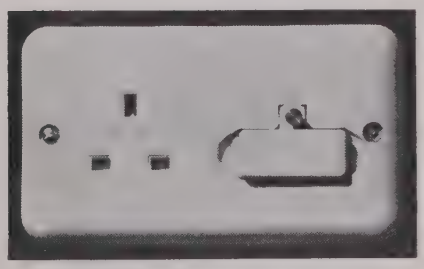
For a new pulse-welding technique where high-current short duration pulses with high peak voltages are required, ASSOCIATED ELECTRICAL INDUSTRIES, LTD., Electronic Apparatus Division, Valve and Semiconductor Sales Department, Lincoln, have developed two new ignitrons. Designated types BK300B and BK302B, they are of coaxial construction in which the current flows through the ignitron from anode to cathode and then up the valve wall to a cathode flange terminal at the top. This coaxial current flow provides a mag-

netic shield to eliminate the arc deflection which the high peak currents might cause in standard ignitrons.

The units are water-cooled and can be supplied with thermostats for over-temperature protection. Both types are provisionally rated at 2,500 V maximum peak anode voltage. The BK300B, which is equivalent to the American GL7670, has provisional anode current ratings of 2,000 A peak, 10 A mean, and the BK302B has double these ratings.

SOCKET OUTLET / SPUR CONNECTOR

The combined socket and spur connector introduced by NETTLE ACCESSORIES, LTD., Harper Road, Wythenshawe, Manchester, 22, provides a single plate designed to mount on to the two-gang B.S. 1363 type box with one B.S. 1363 socket

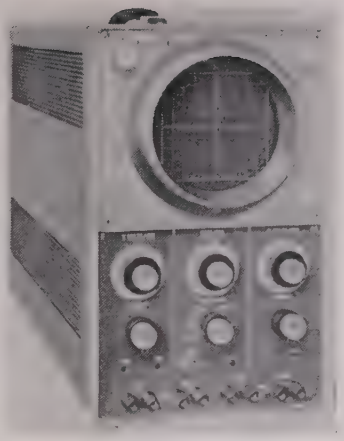


Nettle combined socket outlet and spur connector

outlet and one spur connector position side by side. The connector, intended for joining fixed appliances to the supply, is provided with a B.S. 1362 removable fuse link, mounted on a fuse carrier which is detachable from the front of the plate by unscrewing a finger nut. Both the socket outlet and spur connector are provided with terminals which will accommodate up to three 7/·029 conductors, thus making the unit suitable for connection into ring main circuits. The catalogue number is 3045 and the unit is available at 124s per dozen in brown or 136s in ivory.

HIGH-SENSITIVITY OSCILLOSCOPE

The DuMont type 403-B oscilloscope announced by AVELEY ELECTRIC, LTD., Ayron Road, Aveley Industrial Estate, South Ockendon, Essex, has



DuMont 403-B oscilloscope available from Aveley Electric, Ltd.

a sensitivity of 50 μV/cm and a low noise level to permit resolution of signals as low as 10 μV. This makes possible the display of non-amplified outputs from most strain gauges, pressure pick-ups, accelerometers and other transducers. Its 21 calibrated sweeps extend from 1 μsec/cm to 5 sec/cm with a vernier providing continuous adjustment between steps—and extends the 5 sec/cm range to slower than 25 sec/cm for a 250 sec maximum sweep duration. A single sweep mode permits but one driven sweep of the time base to appear on the cathode-ray tube until the sweep is reset. An available accessory kit allows the user to rearm the sweep from external switch closures.

Other features include a nominal drift of less than 500 μV/hr after warm-up, an a.c. stabilising control, a "sync-ready" indicator for signalling optimum trigger adjustments, no selected tubes or components, and a 5 kV cathode ray tube.

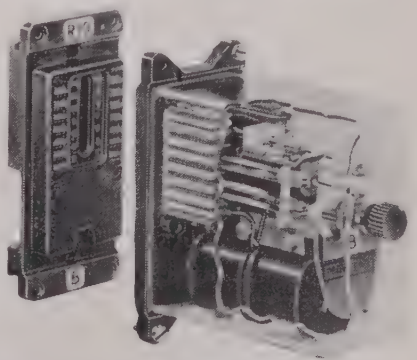
ROTATION MONITORS

Units designed to give a warning when a monitored shaft (or any reciprocating or linear motion) slows down or stops are announced by PENTECHNIQUE, LTD., Imperial Lane, Cheltenham, Glos. Pulses obtained from the shaft by a magnetic transducer hold a relay in the shaft rotation monitor in an energised condition. When the shaft stops rotating the relay becomes de-energised and the relay contacts actuate alarm signals, warning lights or other control signals. Semiconductor devices are used throughout and a power supply is incorporated enabling the equipment to be operated from normal mains supplies. No warm-up time is necessary. Although normally intended for use with magnetic pick-ups, designs are available for use with switch contacts and photo-electric pick-ups.

The monitors measure 6in high by 4¼in wide by 3½in deep and can be supplied with either wall (surface) mounting or panel (flush) mounting cases. Both kinds are fitted with mains switches and warning lights and the internal relay is of the dust-proof plug-in type with 2-pole changeover contacts rated at 250 V 5 A a.c. Special monitors can be supplied to switch at specified shaft speeds and other modifications include the provision of alternative relays, power transistor output stages (for the direct operation of small solenoids), variable delayed pull-in and drop-out circuits, and power supplies for different mains voltages. Prices range from £17 13s.

FLEETING CONTACT RELAY

Momentary operation of one of the contacts on a relay, either when it is energised or when it is released, is



Clifford & Snell fleeting contact relay

achieved by CLIFFORD & SNELL, LTD., by mounting a small subsidiary relay in one of their D.2600 series plug-in relays. This small relay can be connected so that it operates for about 0·1 sec, either when the main relay is energised or released, or both when it is energised and released. The combined relay unit can be used in any position and in mobile applications, and the contact can be normally closed. This feature means that the relay can be used to break the "hold" circuit of a relay or contactor, i.e. perform the same function as the "stop" push on a contactor. The sole distributors are D. Robinson & Co., Ltd., 5/7, Church Road, Richmond, Surrey.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The Midlands Electricity Board has appointed **Mr. R. Mallet,** B.A., M.I.E.E., at present manager of the Board's Worcestershire Area, as chief engineer, in succession to Mr. G. S. Buckingham, B.Sc., M.I.E.E., who, as recently announced, becomes deputy chairman on 1st January.



Mr. R. Mallet

Mr. Mallet, whose home is at Droitwich, was educated at Eastbourne College and at Trinity Hall, Cambridge, where he graduated in the mechanical sciences tripos. From 1934 to early 1937 he was a student apprentice with the B.T.H. Co. at Rugby. After holding appointments with the Cambrian Power Co., the Buckrose Lighting & Power Co. and the South East Yorkshire Power Co. Mr. Mallet joined the staff of Edmundsons Electric Corporation in 1945, becoming manager of the Shropshire, Worcestershire & Staffordshire Power Company's Redditch District in 1946. He was appointed chief assistant engineer, Midlands Electricity Board, in 1948 and deputy chief engineer the following year, taking up his present position in 1951.

In 1949 Mr. Mallet was a member of the British Electricity Supply Productivity Team which visited the United States; and he was subsequently associated in the pioneer work which the Board has carried out under Mr. G. F. Peirson, the chairman-elect, in the development of high-speed auto-reclosers for overhead line protection, and live-line working.

Mr. J. Gledhill has been promoted from the position of commercial manager to works manager of the Yorkshire Switchgear & Engineering Co., Ltd.; **Mr. C. Dickinson,** outside sales engineer in the areas of the North Western Electricity Board and the two Scottish Boards, has been appointed contracts manager; and **Mr. F. Green** has been appointed sales engineer to cover the areas of the South Western and South Wales Electricity Boards.

Mr. Gledhill joined the company in 1947 and held various appointments in the contracts and sales engineering section until 1952. From then until his appointment as commercial manager in 1955 he was in charge of the internal sales department. Mr. Dickinson joined the company as a student apprentice in 1945 and served in the drawing office and contracts engineering sections before becoming outside sales engineer in 1957. Mr. Green has previously been operating in the area of the South Western Electricity Board on behalf of South Wales Switchgear, whom he joined after previous service with the Electrical Apparatus Co., Ltd. He received his early training with Ferguson Pailin, Ltd., and A. Reyrolle & Co., Ltd.

Awards made by the Council of the Junior Institution of Engineers for papers and lectures delivered during 1960-61 include the Institution gold medal to **Mr. R. F. W. Guard,** of London (for his paper "Nuclear Fuels"); the Institution silver medal to **Mr. E. R. Brazier** ("Engineering in Chemical Works"); and the Vickers prize and medal to **Mr. John Heywood** ("Radio Investigation of the Solar Atmosphere").

Mr. M. G. J. Fry, A.M.I.E.E., B.Sc.(Eng.), A.C.G.I., technical manager of Brentford Transformers, Ltd., has joined the board and has been appointed technical director. **Mr. A. Newing,** M.I.E.E., has joined the board as a non-executive director.



Mr. J. Gledhill



Mr. C. Dickinson



Mr. F. Green

A meeting of the **Birmingham Electrical Golfing Society** was held at Copt Heath Golf Club on 21st September, the competition being a four-ball medal alliance for the autumn trophy. The winners were Messrs. F. Stockford and E. G. Noake and the runners-up Messrs. G. A. Paisley and G. W. Arnold. Other prize winners were Messrs. S. A. Seccombe and J. B. Newton.

Mr. F. H. Farthing, Midland area manager of the General Electric Co., Ltd., has retired. Mr. Farthing has had a varied experience over the 44 years in which he served the company. As a young man he was posted overseas to Hong Kong, returning to the Engineering Works at Witton in the late 1920s. In 1929 he joined the Marine Sales Department and in 1935 assumed control of the company's showrooms at head office. After service during the last war in the Royal Air Force, in which he attained the rank of wing commander, he returned to the G.E.C. Sales Department, London, where in 1950 he took control of the sales force dealing with wholesale distributors. In 1956 he was appointed manager of the Brighton branch, in 1959 South Eastern area manager and last year Midland area manager.



Mr. F. H. Farthing

Mr. Farthing is well known in the electrical industry for his keen interest in golf and as hon. secretary of the Electrical Industries' National Golf Championship for six years he played a leading part in raising some £20,000 for the E.I.B.A. funds. For 20 years he was hon. secretary of the G.E.C. Golfing Society. He intends to continue in active business and in the near future will be taking up a number of agencies.

The Central Electricity Generating Board has appointed **Mr. H. B. Laine,** B.Sc., M.I.E.E., A.M.C.T., as regional electrical engineer, South Eastern Region. Mr. Laine is responsible to the deputy regional director for the planning and construction of all local transmission reinforcements and new supply points in the region and for the supervision of site projects. This work will be divorced from the operation and maintenance of the transmis-

(*Continued on page* 515)

'HIDUTAC' switchfuses remain operative after 120,000 operations at 1½ times full tungsten lighting load



Type tests prove that 'Hidutac' switchfuses will interrupt their full load current with unfailing reliability—just one of many 'Hidutac' exclusive features resulting from the *new approach* of the G.E.C. Installation Equipment Group to switchgear design. The *new approach* has crystallised from G.E.C.'s many years' experience of making switchgear superbly well.

Consider these other impressive advantages: *High breaking capacity*—8 times the rated full load current—through cam-operated, double-break, silver contacts. *Total internal enclosure* of all moving parts, with shields over live terminals. *High fault-current protection* in Single Pole and Neutral, Double Pole, Triple Pole, Triple Pole and Neutral switchfuses with H.R.C. or rewirable fuses. Categories of duty are:—H.R.C. fuses, all ratings, AC4 of BS88 (33000 amp); rewirable fuses, 15 and 30 amp ratings, S2A of BS3036 (2000 amp); rewirable fuses, 60 amp rating, S4A of BS3036 (4000 amp). *Modern styling* of pressed steel case with fully interlocked cover.

These exclusive features make 'Hidutac' switchfuses vastly superior for tungsten and discharge lighting control, motor, and transformer and capacitor switching.

IMMEDIATE DELIVERY of 'Hidutac' switchfuses from wholesalers throughout the country. For more detailed information ask your wholesaler for 'Hidutac' literature.



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Whichever way you look at it, these circuit breaker isolator jaws for an Ellison switchboard represent a minor masterpiece of engineering. They mirror that striving towards perfection so evident in every component that goes into the making of Ellison Switchgear.

Ellison Switchgear is manufactured to a standard rather than to a price, in the honest belief that this is the only way of manufacturing completely reliable switchgear. Ellisons have been long enough in the business to know what they're talking about.

Their formula? . . . Traditional skill, modern production methods and over half a century of specialised engineering knowledge. Add to this, bold and dynamic design that will still be ahead of its time in the next half century and you will understand why Ellison Switchgear is the finest in the World.

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sion system which will remain the responsibility of the assistant regional directors.

The South Eastern Region has also made the following appointments:—*Transmission Development and Construction*: Mr. J. W. Carroll, deputy regional electrical engineer; Mr. B. Farnworth, transmission project engineer (North Thames); Mr. E. P. Cardew, transmission project engineer (South Thames); and Mr. R. S. Oliver, system development engineer. *Transmission Maintenance Operation, North Thames Division*: Mr. D. W. Lackie, transmission engineer (operation and maintenance), Mr. A. E. Lane, technical engineer. *South Thames Division*: Mr. W. G. Todd, transmission engineer (operation and maintenance); Mr. G. S. H. Jarrett, technical engineer.

Mr. W. G. Todd, M.I.E.E., who, as reported above, has been appointed divisional transmission engineer, South Thames Division, C.E.G.B., joined the Transmission Department of the South Eastern Division in 1948, becoming a



Mr. W. G. Todd



Mr. G. S. H. Jarrett

senior assistant engineer in 1955. Before nationalisation he served with the Hastings and Great Yarmouth undertakings and the Central Electricity Board.

Mr. G. S. H. Jarrett, Wh.Sc., B.Sc., A.M.I.E.E., who becomes technical engineer of the South Thames Division, started as an electrical draughtsman at the National Dockyard at Sheerness in 1935 and joined the C.E.B. in 1947. After vesting day he was with the South Eastern Division at Kingston and Croydon, becoming assistant divisional electrical engineer in 1960.

After nearly 40 years in the electrical industry, **Mr. James Welsh,** Glasgow area sales superintendent of the A.E.I. Lamp & Lighting Co., Ltd., since 1955, has retired. For a short time, Mr. Welsh worked for a Glasgow firm of electrical wholesalers and then joined Metro-Vick Supplies, Ltd., as a representative in 1925. Five years later he moved to the Edison Swan Electric Co., Ltd., and worked as the senior representative at Glasgow until taking up his last appointment. For the past 15 years he has been secretary of the Glasgow Centre of the Illuminating Engineering Society. He has been succeeded by **Mr. M. S. Dickie.**

Sir William Cook, member for reactors of the United Kingdom Atomic Energy Authority, and seven members of the Reactor and Research Groups, left for the U.S.S.R. last Tuesday. This is an exchange visit during which the party will discuss reactor physics and experimental fast reactors with Russian scientists.

Mr. W. Bayley, electrical sales manager of Remploy, Ltd., has been appointed to the newly-created post of electrical and hardware manager, Engineering Group. In addition to his duties as sales manager, Mr. Bayley will now be responsible for the production of all electrical goods in the Engineering Group's factories, and also for the control of sales of Remploy tubular sheathed elements. Before joining Remploy in 1955 Mr. Bayley was world sales manager of Solus-Schall, Ltd., now part of the Murphy Radio group.

Mr. Sidney H. Ireland, B.Sc., B.Com., has been appointed managing director of the Consolidated Pneumatic Tool Co., Ltd., in succession to **Mr. Norman Readman,** who becomes chairman of the Board. Mr. Ireland, who was for some years general manager of the Birmingham Small Arms Co., Ltd., joined Consolidated Pneumatic at the beginning of 1960 as assistant managing director.

The Minister of Power has reappointed **Sir Edward Lewis, Mrs. G. H. Dunbar,** C.B.E., and **Mr. C. G. Moss,** Associate I.E.E., as members of the London Electricity Board.

The South of Scotland Electricity Board has appointed **Mr. John H. Porter,** B.Sc., A.M.I.E.E., A.M.I.Mech.E., as assistant purchasing officer in succession to **Mr. J. S. Heiton,** who recently retired. Mr. Porter is at present switchgear engineer in the technical section of the Chief Engineer's Department; he takes up his new appointment on 16th October.

Mr. H. Kay, B.Sc., M.I.Mech.E., has been appointed assistant managing director of the Engineering Division of Tube Investments, Ltd. He is at present deputy managing director of the Marine Division of Richardsons Westgarth & Co., Ltd.

Mr. W. P. Howard, publicity manager of Ferodo, Ltd., has been

(*Continued on page 516*)

Yorkshire Board Appointments

THE Minister of Power has appointed **Mr. A. Bond,** L.M.T.P.I., Companion I.E.E., to be chairman of the Yorkshire Electricity Board in succession to **Mr. D. Bellamy,** C.B.E., D.L., F.A.C.C.A., F.C.W.A., Companion I.E.E., F.R.Econ.S., F.S.S., who retires on 24th February, 1962, after serving as chairman of the Board since February, 1952. **Mr. R. H. M. Barkham,** B.Sc.(Eng.), M.I.E.E., is to succeed Mr. Bond as deputy chairman of the Board.

Mr. Bond has been deputy chairman of the Yorkshire Electricity Board since 1st February, 1952. A solicitor and former Town Clerk of Macclesfield and Stockport, he was secretary and solicitor of the Eastern Electricity Board from 1948 until 1952.

Mr. Bellamy, after four years with the Kettering Urban District Council and active service from 1915 to 1919, joined the Hull Corporation Electricity Department as commercial assistant, becoming deputy commercial manager in 1935 and general manager in 1938. He was deputy chairman of the Yorkshire Electricity Board from January to May, 1948, then manager of the Hull Sub-Area until 1952 when he became chairman of the Board.

Mr. Barkham has been chief commercial officer of the Eastern Electricity Board since 1955 and has served as a member of the Board since 1st June, 1959. Before nationalisation he served with the East Anglian Electric Supply Co., Ltd., and was manager of the Urban Electric Supply Company, Grantham. From 1948 until 1955 he was manager of the Essex Sub-Area of the Eastern Board.



Mr. A. Bond



Mr. D. Bellamy



Mr. R. H. M. Barkham

appointed public relations officer to the Turner & Newall Group, of which Ferodo, Ltd., is a member. Mr. Howard, who was formerly with the General Electric Co., Ltd., is succeeded at Ferodo, Ltd., by **Mr. P. R. W. Jupe.**

Mr. F. G. Rowland, M.I.E.E., director and general manager of Switchgear & Cowans, Ltd., has been appointed joint managing director with the chairman of the company, Mr. J. L. Rowbotham, M.I.E.E.

OBITUARY

Dr. C. C. Garrard.—We regret to record the death, on 21st September, of Mr. Charles Cornfield Garrard, Ph.D., M.I.E.E., M. Amer. I.E.E., M.Brit.I.R.E., a former director of the General Electric Co., Ltd., and a leading authority on switch and control gear. Dr. Garrard was born in London in 1877 and educated at the Central Foundation Schools of London, Finsbury Technical College and the University of Göttingen, where he became an assistant to Professor Nernst. In 1900 he returned to England as engineer to the Nernst Electric Light Co. and later joined Ferranti, Ltd., as head of their experimental department and manager of the instrument and transformer department. In 1908 he was appointed manager of the switch and controller works of the G.E.C. at Witton, a position which he held until 1943 when he became joint general manager of the Engineering Group. In the same year he was elected a director of the G.E.C. and from 1946 until his retirement in 1953 he was resident director, Witton Works.

Dr. Garrard was a past-chairman of the I.E.E. South Midland Centre and past-member of the Council of the Institution. He had contributed numerous articles to the press on technical and commercial matters and his book, "Electric Switch and Controlling Gear," was one of the standard treatises on the subject. For an I.E.E. paper on standardisation he was awarded the Paris Premium.

Mr. C. M. Vignoles, C.B.E.—The death occurred last Saturday in Italy, at the age of 60, of Mr. Charles Malcolm Vignoles, a director of Evershed & Vignoles, Ltd., and since June last chairman of the company of which his father, Lieutenant-Colonel W. A. Vignoles, was a former managing director. Mr. C. M. Vignoles was associated for many years with the oil industry, becoming managing director of Shell-Mex & B.P., Ltd., a position which he held for ten years until his retirement this year.

Mr. S. Bellis.—The death occurred on 17th September of Mr. Samuel Bellis, sales manager (central marketing) of British Insulated Callender's Cables, Ltd. He was 63 and died in hospital at Cobham, Surrey. Mr. Bellis started with W. T. Glover & Co., Ltd., before the 1914-18 war, in which he served in the infantry and the Royal Flying Corps. In 1919 he joined the former British Insulated & Helsby Cables, Ltd., in the Estimating Department at Manchester, later becoming a sales representative. He was appointed manager of the Blackburn branch in 1930 and following the amalgamation with Callender's Cable & Construction Co., he became manager of the Leeds branch of the new company. Five years later Mr. Bellis was transferred to London as assistant home sales manager and in 1952 he was appointed sales manager, London, becoming sales manager (central marketing) in 1957.



The late Mr. S. Bellis

Mr. P. F. W. Bush, M.I.Mech.E., M.I.E.E., died on 19th September at Shoreham, Sussex. He was 80 years of age.

Resumption of Glasgow Electric Services

Electric train services on the suburban lines in the Glasgow area north of the River Clyde are to be restored on Sunday, 1st October. The electrification of the 52 route miles between Helensburgh and Airdrie at 25 and 6·25 kV was completed last autumn and the service was inaugurated in November. After a series of transformer explosions the trains were withdrawn from service in December. In an interim report into these failures the Ministry of Transport's chief inspecting officer of railways, Brig. C. A. Langley, stated that the primary cause of the failures was faulty design of the train transformers. There had also, however, been several rectifier backfires caused by overheating due to defective ventilating arrangements and some control gear failures. A number of modifications to the train equipments, including a redesigned transformer and replacing the conservator tank outside the coach, have now been completed by the manufacturers, A.E.I., Ltd.

Industrial Accidents Increase

For the second consecutive year there has been an increase in the number of industrial accidents. In 1960 the total number of accidents reported to the factory inspectorate was 190,266, 9 per cent more than in the previous year, of which 675 were fatal. The increase has been spread over a wide number of industries according to the annual report of the Chief Inspector of Factories published this week (H.M. Stationery Office, Cmnd. 1479, price 7s). There were 822 electrical accidents in the year under review, compared with 738 in the previous year. The number of fatal accidents was 41, an increase of seven over 1959. An appendix in the report analysing these accidents shows that a large proportion, 219, of which 16 were fatal, arose from the use of portable and transportable equipment, excluding accidents due to welding eye flash. Contact with overhead transmission and distribution lines caused eight deaths. The causes of these accidents and methods of preventing them will be discussed fully in "Electrical Accidents and their Causes 1960," which will be published shortly.

AUSTRALIAN NEWS

The Queensland State Government has approved a £62 million electrical development scheme for the southern and central portions of the State. This will include the construction of two major power stations, one near Ipswich, and adjacent to the West Moreton coalfields (to cost £36 million) and one near the Callide coalfields (to cost £23·5 million). Construction of connecting facilities between the Southern Electricity Authority and the Wide Bay-Burnett Regional Electricity Board at a cost of £1,830,000 has also been approved.

Contracts worth a total of £4·8 million have been approved for equipment and buildings for the 120 MW power station near Collie, Western Australia.

The Tokyo Shibaura Electric Co. is supplying the New South Wales Electricity Commission with seven 330 kV 100 kVA transformers.

NEW E.P.E.A. HEADQUARTERS

We recently reported that the Electrical Power Engineers' Association was in negotiation for a house at Byfleet to serve as headquarters. Now it is reported by the *Electrical Power Engineer* that it is unlikely that the Association will proceed with this and "other possibilities are being looked into."

INDUSTRIAL NEWS

Electricity Supply Claim for £2 Wage Increase

A CLAIM for an increase of £2 a week for the 120,000 employees in the electricity supply industry was submitted to the Joint Negotiating Committee of the National Joint Council for the industry in London last week. The claim which, if granted in full, would cost the industry over £12 million in a full year, is believed to be the largest ever made to a nationalised industry. The members of five unions are involved—the Electrical Trades Union, the Amalgamated Engineering Union, the Transport & General Workers' Union, the National Union of General & Municipal Workers and the National Union of Enginemen & Firemen. The Negotiating Committee is to meet again on 18th October for the employers to give their reply.

Presenting the claim, Mr. Frank Foulkes (general president, E.T.U.), who is chairman of the trade union side of the N.J.C., compared the earnings of the lowest paid workers in the industry with people receiving National Assistance. He said that an unemployed man with a wife and two children received £9 19s a week with no stoppages, whereas a labourer in the electricity supply industry working for 42 hours a week received £9 9s which, after stoppages, was reduced to £8 18s. The trade union side considered that this state of affairs was a disgrace to a nationalised publicly-owned industry. Electricity supply workers were entitled to "more than their subsistence."

He claimed that since nationalisation the real wage rates of manual workers had risen by about 12½ per cent yet each was making an 84 per cent greater contribution to the industry's output. All classes of consumers had benefited, as the average price of electricity had risen only half as much as prices in general. The industry should, at least, pay the equivalent of rates in the advanced sectors of private industry. Ministry of Labour figures for August showed that in engineering and electrical goods average earnings amounted to £15 19s 7d against £13 18s 9d in gas, electricity and water. Therefore supply workers should get £2 a week more, he claimed.

LARGE SYNCHRONOUS CONDENSERS

Two 60 MVA synchronous condensers, believed to be the largest machines of this type ordered for service in Great Britain, are to be supplied to the Central Electricity Generating Board by the General Electric Co., Ltd., for installation in the Fleet substation, near Aldershot, where they will be used to provide power factor correction and voltage regulation for the 275 kV supergrid. The contract is valued at about £360,000. Both machines will be hydrogen-cooled and will be transportable with a maximum weight of 110 tons. They will operate from a 13 kV supply and will provide an output variable over a voltage range of +15 to −10 per cent when running at 1,000 r.p.m.

A.E.U. and Electrical Shop Stewards

The executive of the Amalgamated Engineering Union has forbidden A.E.U. shop stewards employed in power stations to attend an "unofficial" meeting of shop stewards in the electricity supply industry called for tomorrow (Saturday).

It has also decided to fight the action brought by Mr. H. Scanlon, divisional organiser for Manchester, whose election was declared invalid by the executive which ordered a new election.

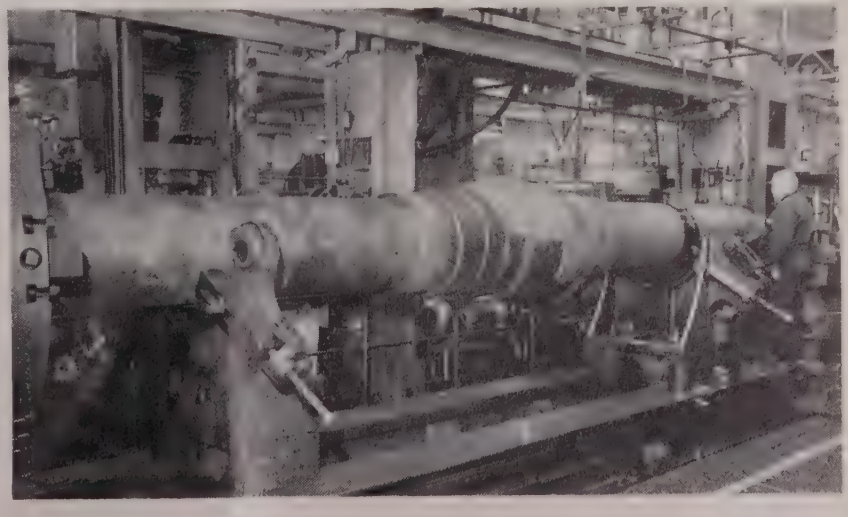
Rural Electrification in Carmarthenshire

CARMARTHENSHIRE is the largest county in South Wales and contains 6,516 farms—almost a quarter of the total number in the South Wales Electricity Board's area—as well as 9,641 other rural premises. Very little electrification had been carried out before the electricity supply industry was nationalised; only 474 (7 per cent) of the farms were, in fact, on supply.

Some idea of the progress made since then was given by Alderman E. Kinsey-Morgan, chairman of the Area Electricity Consultative Council, when the Council met at Carmarthen last week. He said that from 1948 to the end of last March, 3,881 farms and about twice as many other rural premises were connected, bringing the numbers on supply to 4,355 farms (67 per cent of the total) and 9,048 other rural premises (94 per cent of the total). Plans for the completion of rural electrification in the county had already been agreed. Nine major rural schemes costing about £200,000 were in hand for the provision of supplies to 500 farms and 202 other rural premises and in 1962-63 another eight major schemes costing £150,000 would provide supplies to 398 farms and 131 other rural premises. In the remaining two years required to complete the programme, a further 15 major schemes were to be carried out, costing about £212,000.

Rotor for 275 MW Turbine

A low pressure rotor shaft for Britain's first 275 MW steam turbine now being made at the English Electric Co.'s Rugby Works. This is for one of two 275 MW single-line turbo-alternator sets which the company is supplying for the Central Electricity Generating Board's Blyth "B" power station



INDUSTRIAL NEWS *[continued*

All-Electric Flats at Crayford

THREE 13-storey tower blocks of flats, believed to be the first of their kind in Kent to be developed by a local authority, were shown to members of the Kent Surveyors' Association at Crayford on 20th September. Accompanying the party were the chairman and members of the Crayford U.D.C. and Mr. Norman Dodds, M.P. for Erith and Crayford.

The £600,000 redevelopment scheme, being carried out by George Wimpey & Co., Ltd., provides for 263 new all-electric flats and maisonnettes, more than doubling the previous number of homes on the 5½-acre site.

Apart from underfloor electric heating in halls and living rooms, the cost of which is included in the rent, each living room has a 2 kW electric fire. Hot water in the kitchens and bathrooms is provided by immersion heaters. Laundries to serve the estate are on the ground floor of the 13-storey blocks, each of which is equipped with two washing machines, a spin dryer and three drying cabinets. Other facilities include lifts, refuse disposal chutes with electric incinerators on each floor, a central radio and television aerial system and electric extractor fans in the bathrooms.



One of the three thirteen-storey blocks of all-electric flats being built at Crayford

New Lighthouse for Ghana

The apparatus for a new lighthouse at Takoradi, Ghana, has recently been completed at the Crawley works of Stone-Chance, Ltd. It will be housed in a traditional type lighthouse lantern 7ft in diameter on the summit of a water tower. Safeguards against failure incorporated are an automatic lamp-changer to bring a standby lamp into focus; a second motor which starts automatically if the machine rotating the lens should break down; and a standby power plant which will restore the light in a few seconds if the mains supply fails. The apparatus, valued at about £10,000, was ordered by the Ghana Railway and Harbour Authority and is the sixth modern lighthouse installation for the coast of Ghana which the company has supplied.



The optical equipment and rotating mechanism for the new Takoradi lighthouse, Ghana, on test at the Crawley works of Stone-Chance, Ltd.

Heating Conference

IN preparation for a drive to promote electric space heating during the coming winter, nearly 100 members of the Merseyside and North Wales Electricity Board's commercial staff took part in a space heating conference at Liverpool from 21st to 23rd September. The conference was opened by the chairman of the Board (Mr. D. H. Kendon) and subjects discussed included floor warming, heated carpet underlays, home heating by block storage and ducted warm air, and the Board's tariffs in relation to space heating.

The delegates took part in study groups and an open forum session, and the conference was summarised at its close by the chief commercial officer (Mr. W. B. Parkinson).

FLUORESCENT THEME OF ATLAS PUBLICITY

This year's autumn advertising campaign of Atlas Lighting, Ltd., aims to promote the use of fluorescent equipment. Attractive showcards and displays directly linked with the campaign theme include a p.v.c. window sticker saying "Atlas Fluorescent Lighting for All" in bright fluorescent red and a strutted 14in by 6¾in showcard with the legend "Ask here about Atlas Fluorescent Lighting." Another attractive showcard is a gay and colourful variation on the "clown" theme, showing a clown juggling with four actual lamps. There will be a box-type "light-thief" using a fluorescent red background shining through cut-out letters, displays for the "Popular Pack" and "Kitchen-light" fittings and a fluorescent tube display piece.

B.C. POWER CORPORATION'S PETITION

The British Columbia Power Corporation has presented a petition of rights to the Attorney-General of British Columbia asking for permission to appeal against the Provincial Government's assessment of the amount payable for its acquisition of the British Columbia Electric Co., the Corporation's subsidiary. This amount was $111 million, plus $68·6 million for other assets of the Corporation which are being taken over. The Corporation claims that the valuation of the British Columbia Electric Co.'s common shares should be at least $225 million; the company also has preferred shares.

£4½ Million Telephone Cable Contract

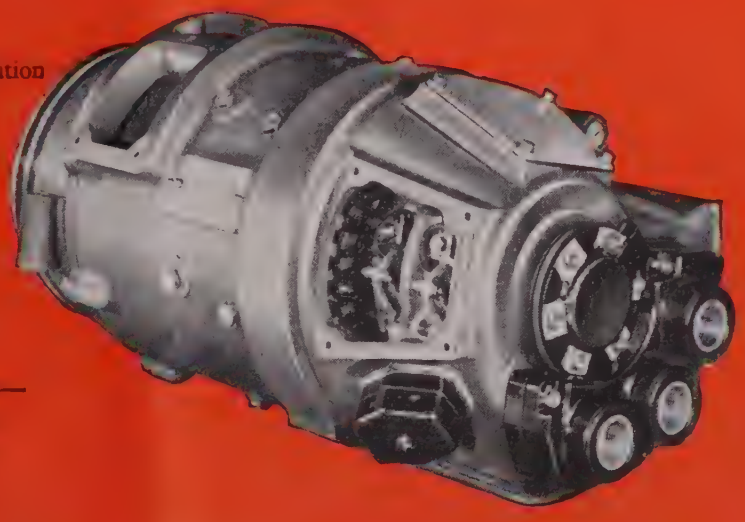
Associated Electrical Industries' Export Company has successfully negotiated a contract worth £4½ million to supply the Republic of Indonesia with telephone cable. The cable will be manufactured by Telephone Cables, Ltd., of Dagenham, an A.E.I. subsidiary owned jointly with Enfield Cables, Ltd. The cable is being supplied to the Ministry of Land Transport, Posts, Telecommunications and Tourism, and delivery will take place over a period of five years.

WITH ONE MATERIAL OR ANOTHER...

M & I combination insulation is used in this A.E.I. salient pole alternator for the Comet-4 jet aircraft. Photograph by courtesy of A.E.I. Motor & Control Gear Division.

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BIG NEW BRANCH AT CARDIFF

offers best ever Bowmaker Service to South Wales

Yet another milestone in the Bowmaker Expansion Programme is reached with the opening of this new Branch at Culverhouse Cross, Cardiff.

Planned to cope with the demand for service to the rapidly growing volume of Caterpillar-built equipment in use on this territory, the Branch consists principally of an extensive service area (18,700 square feet), and a comprehensive parts store (9,500 square feet). Ample space has been provided for substantial stocks of new and used Caterpillar equipment for sale.

The workshops, fully equipped with the most up-to-date facilities, including a twin-headed Link Rebuilding Machine, roller fuse-arc equipment and dynamometer engine-testing apparatus, now constitute one of the finest Tractor repair establishments in the country.

Spare parts stocks up to a value of £100,000 are held and an expansion of Field Service for customers' machines is planned.

All in all, this new Bowmaker Branch represents a notable advance in service to the earthmoving industry in general and to owners of Caterpillar-built equipment in particular.







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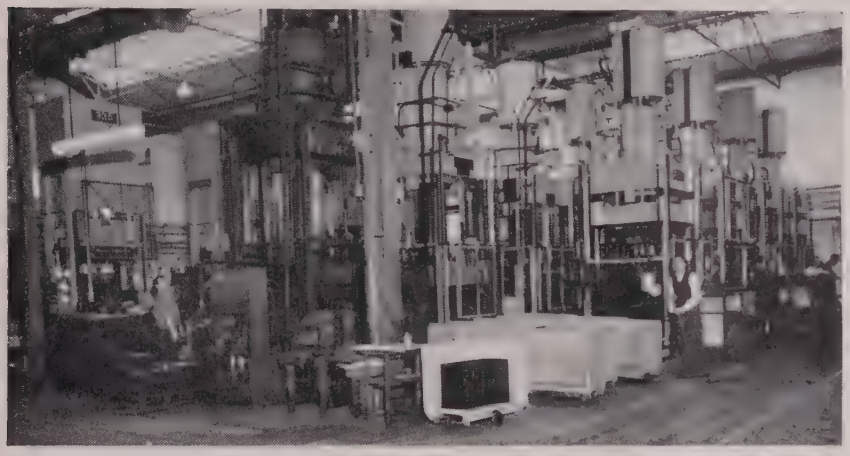
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INDUSTRIAL NEWS *[continued]*

BATTERY CONTAINER MOULDING PLANT

A NEW £500,000 battery container moulding plant was opened at the Little Lever factory of United Ebonite & Lorival, Ltd., on 19th September. The plant, which occupies a self-contained building of 40,000 sq ft, is equipped with the latest automatic devices for measuring and mixing the raw materials, and "Robo-trucks" to carry the processed material to the moulding presses. Underground ducts supply all services to the presses, and the steam pressures used enable faster operating cycles to be maintained. The new plant has its own electricity substation.

The raw rubber and other ingredients are fed to the mixing plant by an automatic proportioning unit controlled by punched cards. When the blending cycle is completed the material is taken from the mill in a continuous sheet, fed through a cooling bath and cropped into sheets. These pass to a vertical cooling elevator, in which they rise to the top floor and down again to the middle floor where they are automatically discharged on to stillages. Here the material undergoes a further mixing process through a smaller Banbury machine to prepare it for the moulding stage. From this mixer the material is transported to the presses by a driverless electric truck, the steering being controlled by an electric cable buried in the ground.



The new battery container moulding plant at the Little Lever factory of United Ebonite & Lorival, Ltd.

Scottish Transmission Line Inquiry

A PUBLIC inquiry into objections to the proposed route of the North of Scotland Hydro-Electric Board's transmission line from Loch Awe, Argyll, to Windyhill, near Milngavie, opened at Aberfoyle, Perthshire, on 21st September. As part of a £1,750,000 scheme to carry power from the Cruachan generating station of the Loch Awe project to Windyhill, the Board is proposing to erect 137ft high pylons along a 53-mile route. Colonel A. V. C. Douglas objects to four miles of the proposed route where it passes close to Loch Chon in the Trossachs and suggests an alternative route which would take the line through Glen Dubh, below the east face of Ben Lomond.

Mr. J. L. Sydie, assistant secretary (wayleaves), North of Scotland Board, told the inquiry that the alternative route would add £72,000 to the cost and he considered the Board's route superior; from an amenity point of view, moreover, the alternative route was not served by a suitable road for half its length and there was no road at all over the remainder. The line would be used to bring electricity from power stations in the south during off peak periods and to send electricity to the national grid at peak consumption times. When in operation, there would be no alternative to this supply. As repairs would have to be carried out speedily, it was essential that there should be access for the linesmen.

When the inquiry was resumed on 22nd September, evidence was given by Mr. James Caldwell, assistant engineer in charge of transmission construction, who said that the power lines with which the Board planned to link the Cruachan generating station with Glasgow would carry 400 MW. He agreed that sections of the line would be without road access but said there was no alternative route for that part.

The inquiry was adjourned for at least a month. In the interval, Board engineers will examine an alternative route proposed by Glasgow Corporation.

Data System for N.C.B.

An order worth more than £250,000 has been received by Associated Electrical Industries, Ltd., from the Scottish Division of the National Coal Board for a fully integrated data processing system incorporating the A.E.I. 1010 digital computer.

Measuring Instruments Display

An exhibition of recording instruments made by the Esterline Angus Instrument Co. Inc., of Indianapolis, U.S.A., was held in London last week by Elliott Brothers (London), Ltd. The range of strip chart recorders on view included models with dynamometer and crossed-coil mechanisms for measuring a.c. current, voltage, watts, kVA, kVAr, power factor and frequency; permanent-magnet moving-coil type mechanisms for measuring d.c. current and voltage and speed. Other mechanisms are used for recording events, pressure and vacuum, position and motion. Models include a two-channel recorder, a recording ammeter with a range of 0-50 μA, and expanded scale voltmeters in which the top quarter of the voltage range (0-140 V a.c.) is enlarged to fill the upper 80 per cent of the chart span.

PRINTED BOARD ASSEMBLY REPAIR GUIDE

The booklet, "A Guide to the Repair of Printed Board Assemblies," published by the Electronic Engineering Association, details the correct methods of repairing lightly protected assembly boards, and gives suggestions of the necessary tools required. Diagrams indicate the original assembly methods used by manufacturers and correct methods of removing faulty components and replacing them. The procedure for the removal and replacement of components with multiple connections, such as valve-holders, multi-winding transformers, etc., without causing damage to the printed board is given together with information on the resealing against humidity and atmospheric corrosion elimination. The booklet is obtainable from the Association at 11, Green Street, London, W.1, price 3s post free.

INDUSTRIAL NEWS *[continued*

B. S. & W. Whiteley's 75 Years

ON 16th September over 700 guests were present at a luncheon held in a marquee on the sports field of B. S. & W. Whiteley, Ltd., Pool-in-Wharfedale, Yorks., to celebrate the company's 75th anniversary. All employees, with their wives and friends, were present. Mr. Anthony M. Browne, president of the British Electrical & Allied Manufacturers' Association, proposed the toast to the company and paid it a tribute for its notable part in the development over the last 40 years of the electrical engineering industry. The company had provided a very large proportion of the pressboard used in transformers and e.h.v. switchgear made in this country for home and overseas. The chairman and managing director of the company, Mr. William Whiteley, spoke of the bright future which appeared to stretch before them. He said today he was concerned only with reporting the progress in the production of "Elephantide" pressboard in this country, but his successor 25 years hence would need to report on production overseas. He said it was hoped that by 1962 production of their pressboard would commence in Mysore, India.

Mr. Whiteley made reference to the company's technical director, the late Sir Arthur Fleming, who had been concerned in laying the foundations of the scientific development and testing of production. He also said that the company was continuing to make a substantial contribution to export trade.

Mr. C. W. Whiteley (director) proposed the health of the guests and Mr. J. F. T. Langley (president, British Paper & Board Makers' Association) responded.

During the function presentations were made to two directors, Messrs. William and Holmes Whiteley, and two other directors, Messrs. D. H. and J. H. Whiteley, conducted the proceedings.

A.E.I. to Make Sealed-Charge Car Batteries

Two new ranges of car batteries in which the plates have been charged and hermetically sealed at the factory are being introduced by Associated Electrical Industries, Ltd. The batteries are being manufactured at the Ponders End (Middlesex) factory of the A.E.I. Electronic Components Division and are produced as standard and heavy duty units in both 6 and 12 V sizes. They will be shown for the first time at the International Motor Show. Sales inquiries should be addressed to the Accumulators Department, A.E.I. Electronic Components Division, Ponders End, Middlesex.

COOKER MANUFACTURERS' REPORT

We regret that in dealing with recent electric cooker developments in our last issue (and in the accompanying leaderette) we relied on figures which were subsequently corrected. Although there was a substantial fall in the proportion of two-plate cookers supplied in June as compared with June last year, it was not so great as indicated: the decline was actually from 2·84 to 1·4 per cent. Likewise the increase in the proportion of the cookers with four or more plates of the total sold was from 29·85 (not 4·03) to 43 per cent.

TRANSISTORISED COUNTERS FOR SOUTH AFRICA

Advance Components, Ltd., have recently received an order, through their sales agents and distributors, Dowson & Dobson, Ltd., for six transistorised counters, type TC1, from the South African Government for the South African Post Office.

TRADE ANNOUNCEMENTS

Hedin, Ltd., of South Woodford, have taken over additional office and works accommodation at Fowler Road, Hainault, Essex. The manufacture of industrial heating elements and resistances will continue to be carried out at South Woodford whilst furnaces and ovens will be made at Hainault. Mr. Dennis Hobson has been appointed sales manager of the Furnace Division.

Thorn Electrical Industries, Ltd., are opening a new depot at 10, Severn Street, Belfast, 4 (telephone: Belfast 56004). The depot manager is Mr. R. A. Bibby.

B. & R. Relays, Ltd., have extended their technical sales representation to Northern Ireland. Mr. Alan Young, the company's representative in Scotland, based on Glasgow, is now covering that area.

Wolf Electric Tools, Ltd., have appointed Mr. Johannes Bundgaard as sales supervisor in Denmark.

Gatehill Beco, Ltd., have acquired additional factory space which will be used for the assembly of "Coalglo" and "Log-Glo" fires. It is expected that the extra facilities will enable the company to double the daily output of these models.

From 30th September the address of the Kingston-on-Thames office of **Hepworth Electrical Developments, Ltd.,** and their parent company, the **Hepworth Iron Co., Ltd.,** will be Stafford House, 145, London Road. The telephone number (Kingston 9884) is unchanged.

The offices of **Cawkell Research & Electronics, Ltd.,** have been moved temporarily to 99, Uxbridge Road, Ealing, London, W.5 (telephone: Ealing 6215/7585). The final move to the company's new premises at Park Royal is expected to be completed within the next few months.

Black & Decker Acquire Italian Company

Italy's principal electrical power tool manufacturing concern, Star, has been acquired by Black & Decker. Mr. Robert Appleby, managing director of Black & Decker in the United Kingdom, said that as a result of this acquisition they could expect to gain a greatly increased share of the European market. Other advantages would be a wider range of electrical power tools for industry in Britain at competitive prices; easier provision of double-insulated tools in European countries where this specification was laid down; and immediate exchange of products and techniques.

The Star plant, at Civate in the Italian Alps, near Lake Como, has an area of 86,000 sq ft.

Storage Heater Prices

Since 1st September all thermal storage space heaters, both domestic and commercial, have been subject to purchase tax. The General Electric Co., Ltd., announces that the list prices of its "Nightstor" heaters remain unaltered but the total prices, including purchase tax, are now as follows:—HO.6310 (1 kW) £14 14s 9d; HO.6312 (1 kW) £16 5s 5d; HO.6315 (1½ kW) £19 9s 10d; HO.6320 (2¼ kW) £26 8s; HO.6321 (2¼ kW) £26 8s; and HO.6330 (3 kW) £28 14s.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

"Dowsing" for Buried Cables

WITH reference to the recent correspondence on this subject, it is, of course, quite proper that a sceptical attitude towards "dowsing" for cables or for anything else should be adopted until one has seen or conducted a properly controlled experiment.

During the course of certain works with which I have been associated it was necessary to avoid damaging buried cables and it was found that rather than depend on old drawings which were sometimes incorrect, certain staff used "dowsing," as it is called, in order to locate the cables. Because of the success which they appeared to have had, but being very sceptical, I decided to run a series of experiments in order to establish whether there was anything in this unusual procedure. As a result I am now bound to accept that here is a phenomenon which seems to be inexplicable in the terms of any knowledge which we now possess. Quite often in these experiments operators "discovered" cables which did not in fact exist but on other occasions they found cables and followed their routes with complete accuracy without any foreknowledge of such routes and without any local indications.

As a method of locating underground objects it can be very inaccurate, but as a phenomenon which is most real it surely ought to be investigated further. One would hope that some university research department will conduct a few experiments so as to shed a little more light on a phenomenon which for some peculiar reason seems to have escaped the attention of or to have been ignored by researchers. I should be most interested to see their results.

Hull, Yorks. C. FOSTER, A.M.I.E.E., A.M.I.Mech.E.

Early Long-distance Transmission

WITH reference to the American claim for the world's first long-distance electrical transmission at Buffalo in 1896 as mentioned by "Reflector" in "Views on the News" in your issue of 15th September, I should like to remind you of the famous Lauffen-Frankfurt transmission of 100 h.p. over a distance of 110 miles at the time of the Frankfurt Exhibition in 1891.

Use was made of some spare power at the waterfall on the River Neckar at Lauffen, near Heilbronn, in Germany, to drive two turbines coupled to three-phase alternators intended for lighting the town of Heilbronn, six miles distant. The suggestion was made in the autumn of 1890 to seize the opportunity afforded by the Frankfurt Exhibition to show what could be done in the way of transmitting power for a long distance at high voltage and to demonstrate the advantages of three-phase transmission.

The transmission line, consisting of three copper conductors, was erected by the German Post Office. The very low generating voltage of 55 V was stepped up to 8,500 V for transmission to Frankfurt, and then reduced to 65 V for the lighting of the exhibition, with about a thousand glow lamps. A 100 h.p. three-phase motor was used to drive a centrifugal pump. An account of this pioneer work is given in S. P. Thompson's "Polyphase Electric Currents" (1900).

Welling, Kent. J. F. PERRIN, A.M.I.E.E.

Electricity Supply Scholarship Scheme

TO enable the rapidly-expanding electricity supply industry to meet its future requirements for scientists and engineers the industry is offering 61 university scholarships to outstanding school-leavers. The scholarships provide for the payment of all tuition and other university fees (which may amount to £100 or more a year), plus a maintenance grant of £375 a year at Oxford and Cambridge, £360 a year at London and £330 a year at other universities. These rates are well above the level of corresponding local authority awards and will be paid to all scholars, irrespective of their parents' income.

Both boys and girls, aged from 17 to 21, who wish to become scientists or engineers, are eligible to apply. Thirty-six scholarships, all in electrical engineering, are offered by the combined Area Electricity Boards and 25 scholarships, in a wide range of science and engineering subjects, by the Central Electricity Generating Board.

Details of the scheme, and application forms, have been sent to grammar and public schools throughout the country by the Electricity Council. In the three years since the scheme was launched more than 150 scholarships have been awarded. Last year 67 awards were made, three of them to girls.

Track Circuit Insulation

THE new illustrated edition of B.S. 456, "Dimensions of Track Circuit Insulation," revises and supersedes the 1932 version. It takes into account the new "A" size rails and specifies the dimensions of track circuit insulation for all rail sections above 85 lb/yd bull head and 70 lb/yd flat bottom, as specified in the appropriate British Standard. The specification now includes solid insulating fishplates, and synthetic resin bonded fabric has been listed as suitable insulating material. An appendix gives information on the rail insulations for superseded rail sections. Other appendices give guidance on the modifications to be made to end posts in order to reduce the effect of metallic dust, and the information to be supplied with inquiry and order.

Copies may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 12s 6d.

INSTITUTION MEETINGS

PROGRAMME FOR THE FIRST HALF OF THE 1961-62 SESSION

THE Institution of Electrical Engineers opens its 1961–62 session in London on 5th October with the inaugural address of the President, Mr. G. S. C. Lucas, O.B.E., and details of the programme for the first half of the session are listed below. Proposed dates for the second half include the following:—Faraday Lecture (Central Hall, London), 14th February; annual dinner of the Institution, 22nd February; conference on the importance of electricity in the control of aircraft, 26th to 28th February; Graham Clark Lecture, 28th March; Supply Section dinner-dance, 4th April; Kelvin Lecture, 26th April; symposium on flameproofing and intrinsic safety in electrical measurement practice (Measurement Section), 27th April; Institution annual general meeting, 17th May; international television conference (Electronics and Communications Section), 7th June; I.E.E. summer meeting at Liverpool, 18th to 22nd June; and a symposium on electric traction (Utilisation Section), 4th July.

ORDINARY MEETINGS

5th October: Inaugural address by the President, G. S. C. Lucas.

26th October: "A Comparison between Generation and Transmission Problems in Great Britain and France," by P. M. J. Ailleret.

2nd November: "Acoustics and the Electrical Engineer," by T. Somerville.

7th December: Parsons Memorial Lecture on "Magnetohydrodynamics," by Professor M. W. Thring.

4th January: Fourth Hunter Memorial Lecture on "The Transmission of Power at High Voltages," by F. J. Lane.

INFORMAL MEETINGS

23rd October: Discussion on "Is Automation Making Satisfactory Progress?" to be opened by Professor A. Tustin.

20th November: Discussion on "Electrical Accidents and their Causes, including the Legal Aspects," to be opened by S. J. Emerson.

22nd January: Discussion on "Aluminium or Copper Conductors?" to be opened by J. C. Bailey and T. L. Richards.

EDUCATION DISCUSSION CIRCLE

17th October: Discussion on "The Place of Digital Computers in the Teaching of Electrical Engineers," to be opened by Dr. P. D. Aylett.

23rd November: Discussion on "The 57 Effects of an Electrical Current," to be opened by Dr. G. S. Brosan.

6th December: Discussion on "Teaching Protective Systems," to be opened by G. Heywood.

16th January: Discussion on "Electrical Engineering Education in the Soviet Union," to be opened by Professor M. G. Say.

MEASUREMENT AND CONTROL SECTION

10th October: Chairman's address on "Trends in Computer Engineering," by W. S. Elliott.

24th October: "The Use of Analogue Computers in Predicting the Space-Time Behaviour of Nuclear Reactors," by R. W. Hockney and Dr. T. O. Jeffries.

8th-10th November: Conference on "Non-Destructive Testing in Electrical Engineering."

14th November: Lecture on "Tracking in Insulation," by N. Parkman.

21st November: Discussion on "The Precision Required in the Calibration of Industrial Instruments," to be opened by P. M. Clifford and A. Felton.

28th November: Section dinner at the Café Royal.

30th November-1st December: Symposium on "Nuclear Electronics," in conjunction with the British Nuclear Energy Conference.

5th December: "Domains and Domain Patterns," by Professor L. F. Bates.

19th December: "The Use of Controllable Semiconductor Rectifiers in Machine Control," by K. G. King.

9th January: "A Linear Transducer of High Accuracy," by P. C. F. Wolfendale.

23rd January: Lecture on "Power Supply Control Systems," by P. F. Gunning.

SUPPLY SECTION

18th October: Chairman's address on "Research and Transmission," by Dr. J. S. Forrest.

22nd November: "Electronic Analogue Computer Simulation of Multi-Machine Power System Networks," by Dr. A. S. Aldred, and "Analysis of Overall Stability of Multi-Machine Power Systems," by J. G. Miles.

13th December: "Electrical Aspects of Hunterston Nuclear Generating Station," by J. Henderson, G. F. Kennedy and Dr. K. J. Wootton. (Meeting arranged in conjunction with the British Nuclear Energy Conference.)

24th January: "Arc Theory and Circuit Breaking," by Dr. H. Edels.

UTILISATION SECTION

12th October: Chairman's address on "Research in the Field of Electricity Utilisation," by Dr. H. G. Taylor.

16th November: "The Design and Performance of High and Low Voltage Terminal Boxes," by K. K. Schwarz.

14th December: Lecture on "Oscillating Machines—Synchronous and Asynchronous," by Dr. E. R. Laithwaite, supported by a paper entitled "An Oscillating Synchronous Linear Machine," by Dr. Laithwaite and R. S. Mamak.

11th January: Discussion on "The Fourth Edition of the Regulations for the Electrical Equipment of Ships," to be opened by G. O. Watson.

12th January: Sectio dinner-dance at the Café Royal.

ELECTRONICS AND COMMUNICATIONS SECTION

25th October: Chairman's address on "Global Communication," by R. J. Halsey.

6th November: Lecture on "The General Problems of F.M. Multi-Channel Communications," by R. G. Medhurst.

15th November: Lecture on "The Performance of Transistor Portable Receivers."

29th November: Lecture on "Recent Developments in Semiconductor Devices and their Applications," by E. Wolfendale.

4th December: Discussion on "Backward Waves in Waveguides," to be opened by Dr. P. J. B. Clarricoats, R. A. Waldron and G. H. B. Thompson.

12th December: "Diversity Reception and Automatic Phase Reception," by L. Lewin.

18th December: Lecture on "Large Microwave Steerable Aerials for Communication with Artificial Earth Satellites and Space Probes," by F. J. D. Taylor.

20th December: Lecture on "Satellite Instrumentation," by Dr. R. L. F. Boyd.

10th January: "Tests of Three Systems of Bandwidth Compression of Television Signals," by G. F. Newell and W. K. E. Geddes.

17th-18th January: Symposium on "Electronic Aids to Banking."

31st January: Lecture on "Storage Tubes," by E. B. B. Callick and Dr. J. C. Firmin.

MEDICAL ELECTRONICS DISCUSSION GROUP

6th October: Discussion on "What is pH and its Measurement?" to be opened by Dr. G. Mattock and G. R. Taylor.

3rd November: Discussion on "Information Theory in Relation to Biology," to be opened by Professor D. M. MacKay.

8th December: Discussion on "The Peltier, Hall and Seebeck Effects."

5th January: Discussion on "Membranes," to be opened by Dr. H. Davson.

I.E.E. and R.Ae.S. LONDON JOINT GROUP

1st November: "Generation of Power in Satellites," by H. J. H. Sketch.

29th January: Discussion on "Automatic Maintenance Testing," to be opened by P. Hearne, Dr. H. Fuchs and A. H. Stewart.

SPECIAL GENERAL MEETING

2nd November: Corporate members only.

ELECTRICAL HOUSECRAFT

The Electrical Association for Women is arranging a conference on the teaching of electrical housecraft to take place on Saturday, 25th November, at the F. L. Calder College of Domestic Science, Myrtle Street, Liverpool, 7. The conference is open to all teachers of domestic science and allied subjects in the Liverpool area.

A course of instruction in preparation for the E.A.W. certificate examination in electrical housecraft for demonstrators and teachers has just been started at E.A.W. headquarters on Monday evenings at 6.30 p.m.

The Association is again holding three-lesson practical courses on plugs, fuses and meters.

Educational

A course of six lectures on "Fuel Cells for Power Production" is to be given at the Polytechnic, Regent Street, London, W.1, on Monday evenings commencing on 16th October.

Power Line Construction by Helicopter

By JOSEPH R. RAUB*

Lack of roads and power hinder the development of many undeveloped areas of the world. A determined approach to this problem has been made by the Puerto Rico Water Resources Authority by their use of an S-58 Sikorsky helicopter in the construction of transmission and distribution lines. This results in reduced construction costs and time, and permits the erection of power lines in previously inaccessible areas

IN January, 1959, the Puerto Rico Water Resources Authority first utilised the S-58 helicopter in an attempt to facilitate a more rapid expansion of the power lines required by the country's recent industrial growth. The first use was in the transportation of 50-65ft poles and cross-arm packages (containing all the electrical hardware) for the new 115 kV transmission lines. Although the initial four months' experimental programme cost about $100,000 more than if conventional methods had been employed, definite savings are now being secured. In 1960, a saving in construction costs of close upon $450,000 was made possible by the S-58 helicopter. To date over 3,000 productive helicopter hauls of poles and cross-arm packages have been made with savings of time and costs of the order of 70 to 80 per cent over former conventional construction methods.

* Civil Engineer, Helicopter Section, Autoridad de las Fuentes Fluviales de Puerto Rico.

Cable Hauling

After proving the use of the helicopter for transport purposes, experiments showed that cable hauling by helicopter was also possible. New equipment was designed for this purpose and, in conjunction with a highly trained ground crew, the S-58 was able to haul not only the overhead earth wire (½in diameter) but also the main s.c.a. conductor for the 115 kV lines. At the present time, about one mile of line can be strung and tensioned daily at a cost of approximately half that with conventional methods. Since the cable hauling phase of the operation has been entered, over 1,100,000ft have been



(Left) Helicopter lifting a transmission line pole

(Below) Transportation of cross-arm packages





Typical terrain showing a line under construction centre foreground and right centre background



Helicopter transporting a distribution pole

placed at the average helicopter hauling rate of 100 ft/min.

It was then decided by the Authority to construct an entire 115 kV transmission line using the helicopter and to obtain exact costs and timing. The 6·9 mile line between Arecibo and Dos Bocas was selected, as it offered ideal conditions for the maximum use of the helicopter. This line involved extremely broken terrain, 46 rock tower sites and complete ground inaccessibility. Although the S-58 was used only one day a week due to the heavy construction schedule of other power line projects, the line was completed in ten working weeks as compared with conservative estimates of 78 weeks for conventional construction methods. Construction costs, excluding materials, were 70 per cent less than with conventional methods.

Not only were 116 poles and 46 cross-arm packages hauled by the S-58, but all movement of compressors and other equipment and materials was carried out by helicopter. Only economical crew movements were made due to the high cost of the helicopter operation. To reduce lost time in crew transportation, portable housing was moved by helicopter and placed near the working areas and then the crews, with radios, food, water and other necessities were moved out on Monday mornings and returned at the end of each week.

In addition, the Authority is using helicopters for distribution line construction and has placed over 1,600 poles in less than 23 operating days. Although the present pole placement cost of these smaller poles is between $15 and $20, it is anticipated in the immediate future to lower this to less than $10 per unit by introducing modified slings which will allow two primary poles or three secondary poles to be transported simultaneously to the line and placed individually in previously prepared holes.

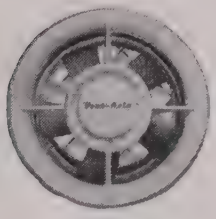
New I.E.E. Structure

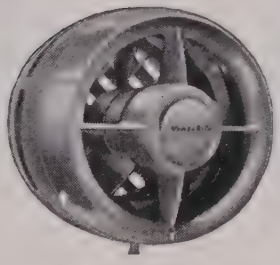
LAST July the Institution of Electrical Engineers announced a reorganisation of the specialised Sections and further details are published in the current issue (September) of the *Journal of the Institution of Electrical Engineers*. The necessary by-law changes to enable the new structure to be introduced are to be submitted to a special general meeting of corporate members on Thursday, 2nd November. It is proposed to replace the four Sections (Supply; Electronics and Communications; Utilisation; and Measurement and Control) with three divisions, two of which will represent " Electronics " and " Power " interests, while a third, a " General " division, will cover fundamental electrical theory and measurement, education and training, and fundamental research in, and the development of, materials and new techniques. It is hoped to put this new scheme into operation at the beginning of the 1962-63 session.

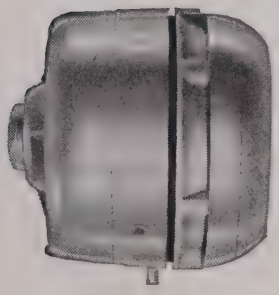
Each division will be sub-divided into specialised technical groups and it is likely that there will be ten such groups in each division. It is proposed that applications of electronics in power systems will fall within the scope of the Power division and vice versa. If the proposals are adopted, and following approval of the necessary by-law changes, each member of the Institution (except students) will be sent a form on which he will be asked to register, if he so wishes, for the division or divisions in which he can demonstrate a professional interest, and indicate, in particular, the individual technical groups with which he wishes to be specially associated.

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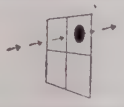
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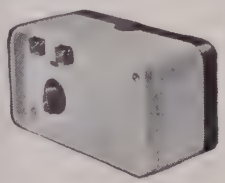
60 Rochester Row · London SWI
Telephone: VICtoria 2244

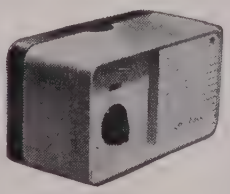
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CONTROL SWITCH
TYPE R

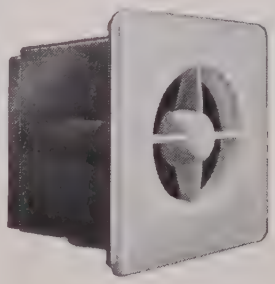


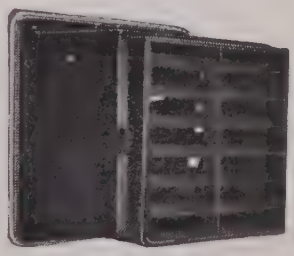


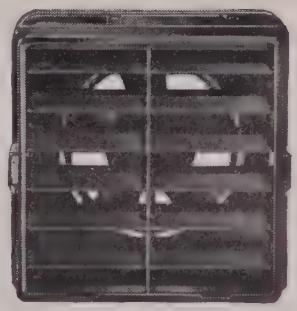
CONTROL SWITCH
TYPE SD

WALL MODELS
with ivory fascia


6″


7½″


9″

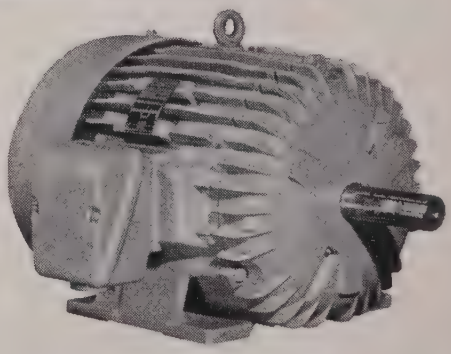

12″

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HUDDERSFIELD

61/13

U.K. Electrical Trade in August

DURING the first eight months of this year electrical machinery and apparatus worth £176 million was exported from the United Kingdom compared with £156 million in the corresponding period of 1960. This increase of 12·5 per cent compares with a rise of 17 per cent (to £553 million) in exports of non-electrical machinery and of 4·5 per cent in total U.K. exports. However, against the steady improvement in total exports which continued in August, electrical exports fell from £22·4 million in July to £18·6 million in August. A year earlier the figure was £18·4 million.

Exports of all the main groups of products, with the exception of cables, have now exceeded last year's levels. The main markets for generating plant and motors, exports of which were nearly £1 million higher during the eight months to August compared with a year earlier, were Australia, South Africa, India, New Zealand, Canada and the United States. However, only Australia and New Zealand recorded higher totals than last year and the falls to the other countries were compensated for by important increases to European countries and many smaller markets. Generating sets over 200 kW, large motors, traction motors and control gear showed the greatest rates of expansion.

Transformers, rectifying plant and switchgear (up by

TABLE I.—ELECTRICAL EXPORTS

Class	Month of August 1961	Eight months ended August 1960	Eight months ended August 1961
	£	£	£
Generating sets:			
Diesel driven not exceeding 10 kW	98,948	1,081,491	879,696
10 kW to 65 kW	112,680	1,129,378	1,118,583
65 kW to 200 kW	109,877	930,624	829,658
Over 200 kW	314,033	1,363,070	2,574,966
Driven by steam turbines	27,526	581,232	276,357
Driven by spark ignition engines, hydraulic turbines or other prime movers	27,601	264,629	733,686
Generators:			
Not exceeding 200 kW	115,503	726,713	1,058,098
Over 200 kW	45,875	849,242	470,765
Parts	403,730	5,815,685	4,136,561
Motors, complete, other than railway, tramway and trolley-bus:			
Not exceeding ½ h.p.	162,101	1,824,908	1,676,436
Exceeding ½ h.p. but under 1 h.p.	50,567	552,678	722,862
From 1 to 250 h.p.	546,183	3,734,760	4,160,859
Exceeding 250 h.p.	198,120	1,369,588	1,338,842
Railway, tramway and trolley-bus motors, complete, and parts of all motors	212,832	1,512,476	1,822,663
Starting and controlling gear for electric motors	298,529	2,097,340	2,942,819
	2,724,105	23,833,814	24,742,851
Converting machinery	48,275	525,810	714,203
Mercury-arc rectifiers	16,509	372,620	381,062
Transformers for lighting, heating and power (including coils):			
Not exceeding 7,500 kVA	436,005	3,583,915	3,351,261
Over 7,500 kVA	234,503	1,982,074	3,156,226
Switchgear and switchboards (excl. telegraph and telephone):			
Switchgear up to 200 A and not exceeding 660 V	456,869	3,461,238	4,182,960
Other	785,479	8,721,662	9,361,274
	1,977,640	18,647,319	21,146,986
Batteries and/or cells, primary:			
For all lighting purposes	116,606	861,786	1,079,608
For radio	277,680	3,058,805	3,110,587
Other	17,992	321,307	367,547
Parts (excluding carbons)	50,717	416,206	536,620
Filament lamps exceeding 28 V	96,551	784,207	883,235
Not exceeding 28 V	30,829	222,403	272,068
Fluorescent tubular lamps	64,361	533,055	703,384
All other lamps	38,801	242,059	303,942
Parts (excl. glass bulbs and carbons)	57,663	370,513	589,394
Radio and television, etc., apparatus:			
Thyratrons, hot cathode mercury vapour and gasfilled rectifiers (excl. mercury-arc rectifiers), photo-electric cells (excl. photo-transistors), stabilising and cold cathode valves, magnetrons, klystrons	95,374	428,749	623,449
Cathode ray tubes	141,861	427,363	976,678
All other	577,239	3,230,553	4,786,543
Parts (excl. glass bulbs)	25,622	408,667	526,954
Broadcasting and television transmitters	35,784	443,987	578,712
Communication and navigational and radar equipment	1,496,819	11,813,898	14,622,715
Domestic receiving sets, mains	71,334	534,694	458,933
Battery (incl. complete vibrator sets)	57,248	638,165	755,922
Other (incl. mains/battery and radio for cars)	25,584	267,626	262,271
Radiograms	28,141	232,012	223,559
Television receiving sets	100,157	507,481	818,104
Public address equipment	94,736	790,923	759,218
Other radio and television apparatus, n.e.s.	205,749	966,593	1,757,276
Components and parts, n.e.s.	1,043,389	8,898,193	10,124,504
	3,999,037	29,588,904	37,274,838
Telegraph and telephone installations	408,793	4,927,115	3,601,841
Telephone instruments	136,520	1,325,440	1,529,801
Parts	655,376	5,422,318	6,794,049
Line app. for long distance communication	266,025	1,871,221	2,218,051
	1,466,714	13,546,094	14,143,742
Cookers	36,591	332,206	336,053
All other cooking appliances	54,258	444,874	454,843
Parts and accessories	59,915	676,763	640,530
Space heating appliances	36,397	192,790	199,029
Water heating appliances	33,512	222,536	311,250
Other heating appliances	56,235	241,514	382,491
Parts and accessories	113,992	674,511	926,144
Irons	65,019	558,827	579,225
Arc welding equipment, a.c.	46,200	378,973	428,885
D.c.	49,127	432,609	368,589
Resistance welding	27,333	300,911	411,409
Electric furnace plant	122,859	734,264	867,110
Sparking plugs	211,129	1,712,362	1,664,099
Electrical appliances for aircraft	441,382	2,322,812	2,574,559
For motor vehicles	492,276	4,761,925	5,160,607
For cycles	20,188	389,533	275,814
Signalling apparatus (incl. traffic signals)	168,202	940,460	1,377,810
Instruments, commercial	185,772	1,585,306	1,579,586
House service meters (electrical) incl. parts	156,620	1,226,377	1,323,728
Electro-medical apparatus (excl. deaf-aids, X-ray apparatus and batteries)	29,252	315,419	287,420
X-ray apparatus (excl. tubes and valves)	63,724	398,704	568,571
Ceiling fans	105,846	699,952	876,017
Desk fans and parts of desk and ceiling fans	38,318	210,587	312,802
Vacuum cleaners	172,470	1,287,654	1,811,004
Floor polishers	45,685	530,975	462,997
Food mixers	113,622	432,962	701,744
Hair clippers and dry shavers	106,164	749,346	945,040
Other portable appliances	45,498	266,629	497,224
Parts	125,564	1,397,511	1,447,480
Portable elec. tools, incl. parts	241,829	1,999,863	2,390,824
Telegraph and telephone cables and wires:			
Submarine	22,269	1,536,773	147,927
Other	190,117	2,871,366	2,925,086
Other descriptions:			
Cotton, silk or man-made fibres insulated	12,929	179,723	262,072
Enamel, glass or asbestos insulated	106,837	898,040	1,147,288
Paper insulated	401,421	4,421,054	4,014,437
Rubber insulated	197,011	2,043,863	2,252,080
Thermoplastic insulated	259,537	2,598,867	2,771,910
Other	135,436	1,587,708	1,697,755
	1,325,557	16,137,394	15,218,555
Accumulators for motor vehicles	143,106	1,047,149	1,220,271
For radio, and other portable	38,031	285,970	304,884
All other accumulators	61,322	377,902	575,781
Parts and accessories	88,186	676,676	914,604
Electric wiring accessories	202,660	1,687,821	1,939,762
Electrical ware (incl. insulators) of ceramic materials, n.e.s.	122,003	977,290	1,073,336
Industrial electronic control equipment	192,850	1,231,312	1,499,481
Insulators and insulating materials, n.e.s.:			
Cloth and tape	45,564	554,396	499,321
All other	156,048	1,047,811	1,117,280
Permanent magnets	57,739	512,729	548,037
Radio, telegraph and telephone testing equipment, n.e.s.	136,317	1,141,285	1,185,176
Scientific electrical instruments (excl. telegraphic and telephonic; time recorders and time switches)	623,312	3,392,832	5,186,179
All electric machinery, apparatus and appliances, n.e.s.:			
Machinery	56,349	410,069	470,032
Other	954,033	7,711,441	9,050,109
TOTAL	18,586,752	156,037,704	176,120,494

TABLE 2.—DISTRIBUTION OF EXPORTS (TABLE 1)

Country	Month of August 1961	Eight months ended August 1960	Eight months ended August 1961
	£	£	£
Gibraltar	17,293	193,039	268,701
Malta	40,077	350,940	440,757
Cyprus	55,194	499,152	615,625
Sierra Leone	73,190	291,367	492,113
Ghana	285,505	2,024,730	2,667,101
Nigeria	387,581	3,948,705	3,482,970
Republic of South Africa	1,301,737	10,729,168	12,333,687
Rhodesia and Nyasaland	571,230	5,085,280	5,203,462
Tanganyika	35,817	387,329	397,113
Kenya	164,006	1,484,237	1,296,427
Uganda	41,361	285,155	435,572
Mauritius	34,472	638,085	296,248
Aden	77,372	461,799	656,923
Bahrain, Qatar and Trucial States	110,302	904,856	1,186,955
Kuwait	132,070	1,636,322	2,033,504
India	1,098,167	10,648,610	9,254,922
Pakistan	330,985	2,650,420	2,604,528
Singapore	217,910	1,760,514	1,863,202
Federation of Malaya	287,644	1,650,505	2,442,267
Ceylon	177,675	1,400,940	1,451,914
British North Borneo	19,280	160,627	188,524
Sarawak	10,415	128,648	85,041
Hong Kong	422,865	3,232,039	3,881,374
Australia	1,234,066	13,874,767	13,976,781
New Zealand	793,541	6,534,444	8,740,403
Fiji	14,850	159,781	224,767
Canada	843,903	9,234,526	8,650,872
Bermuda	63,159	294,775	439,798
Bahamas	27,526	409,536	308,330
Jamaica	158,242	1,269,223	1,402,186
Barbados	31,149	304,032	283,244
Trinidad	117,089	1,204,034	1,148,710
British Guiana	49,977	536,088	408,832
Other Commonwealth countries	110,483	723,643	847,664
Irish Republic	597,044	3,300,717	4,294,845
Soviet Union	233,376	989,222	2,018,627
Finland	130,461	1,377,688	1,399,594
Sweden	495,622	3,943,931	4,432,215
Norway	267,400	2,006,323	2,600,382
Denmark	336,631	2,001,871	2,760,169
Poland	76,242	671,656	1,145,415
Western Germany	663,840	3,926,926	5,743,451
Netherlands	773,958	4,706,223	7,168,619
Belgium	292,594	2,315,580	2,512,274
France	379,393	2,620,392	4,211,185
Switzerland	228,431	1,146,933	1,754,776
Portugal	195,326	1,680,140	1,463,755
Spain	118,828	1,540,589	1,683,827
Italy	445,001	3,085,977	4,354,682
Austria	113,201	586,309	779,219
Yugoslavia	55,606	844,619	792,719
Greece	148,444	726,347	1,463,772
Turkey	236,009	876,995	1,655,539
Portuguese East Africa	26,406	390,541	236,954
Egypt	100,741	747,494	1,009,268
Libya	69,123	459,331	523,928
Morocco (including Tangier)	7,859	220,400	175,846
Congo Republic	41,307	381,697	315,654
Sudan	65,875	970,810	1,362,534
Syria	31,891	332,062	454,586
Lebanon	66,976	445,189	633,499
Israel	73,719	689,608	1,276,508
Jordan	38,577	558,685	685,544
Saudi Arabia	62,463	418,344	594,228
Iraq	180,035	1,809,788	2,334,653
Iran	173,515	1,591,114	2,357,913
Burma	78,521	428,807	472,630
Thailand	61,154	539,939	491,049
Indonesia	95,869	771,156	1,672,684
China	50,365	908,975	561,951
Japan	76,316	574,390	567,222
United States of America	875,530	9,071,763	7,024,588
Cuba	2,308	232,368	172,621
Mexico	51,405	682,170	793,212
Colombia	43,225	358,746	387,836
Venezuela	69,370	2,548,533	777,600
Peru	47,998	219,291	390,137
Chile	66,719	631,500	986,498
Brazil	87,571	388,688	666,348
Uruguay	8,078	190,575	136,802
Argentine Republic	409,746	3,173,625	3,070,193
Other foreign countries	500,550	2,856,361	3,742,426
TOTAL	18,586,752	156,037,704	176,120,494

TABLE 3.—SOURCES OF ELECTRICAL IMPORTS

Country	Month of August 1961	Eight months ended August 1960	Eight months ended August 1961
	£	£	£
Australia	27,662	264,002	450,988
Canada	256,843	934,512	1,582,261
Other Commonwealth countries	357,497	1,764,243	2,143,091
Irish Republic	89,068	868,212	979,070
Sweden	194,447	837,672	1,860,961
Denmark	97,175	531,123	813,069
Western Germany	935,683	6,056,456	7,071,770
Netherlands	497,261	4,575,813	4,785,256
Belgium	28,313	331,831	421,725
France	323,052	1,490,025	2,348,369
Switzerland	224,286	1,324,775	1,757,036
Italy	111,067	1,017,465	919,838
United States of America	1,747,224	12,524,053	13,228,517
Other foreign countries	521,140	1,671,010	3,179,187
TOTAL	5,410,718	34,191,192	41,541,138

£2·4 million) were sent mainly to the large Commonwealth countries and the United States.

The advance of exports of radio and electronic apparatus continued and in the eight months to August the value was nearly £8 million higher than a year earlier. The Netherlands and Canada were the outstanding markets, followed by the United States. Valves, communications and navigational equipment and components were the leading items.

There was also an increase over the whole field of telegraph and telephone apparatus (up by £600,000) with the Commonwealth providing the major markets. The fall of almost £1 million in cable exports is more than accounted for by the smaller shipments of submarine cable to the United States.

After rising for several months, electrical imports fell to £5·4 million in August but this was still £500,000 more than in August, 1960. The total for the eight months to August was up by 20 per cent on a year earlier and though imports from the United States were higher, West Germany sent less. Imports of washing machines fell from £1·5 million to £686,562 and those of refrigerators from £4·8 to £1·3 million in the eight-month period.

TABLE 4.—OTHER ELECTRICAL AND ALLIED EXPORTS

Class	Month of August 1961	Eight months ended August 1960	Eight months ended August 1961
	£	£	£
Domestic electric washing machines incorporating centrifugal water extraction	209,039	2,096,461	3,040,929
Other, with or without wringers	212,293	1,769,330	1,808,689
Dryers (exported as separate units)	15,392	300,785	238,013
Parts	169,473	966,481	1,297,370
Electric locomotives (incl. battery types)	10,443	2,442,057	1,567,789
Diesel locomotives with electric transmission	—	1,952,822	191,101
Welding electrodes:			
Ferrous	97,043	986,791	859,871
Non-ferrous	24,766	207,614	241,904
Electric conduit tubes and cased tubes	56,337	719,711	752,155
Electric carbons	190,623	1,010,475	1,410,548
Electric lighting fittings and lanterns (excl. arc lamps, searchlights and cycle lamps)	337,060	2,705,739	2,820,202
Electric fork-lift trucks	128,939	804,239	1,343,266
Water and gas turbine, etc.	936,365	3,343,967	6,516,743
Steam turbines	374,632	9,103,565	5,313,356

TABLE 5.—ELECTRICAL IMPORTS

Class	Month of August 1961	Eight months ended August 1960	Eight months ended August 1961
	£	£	£
Generators, incl. parts	77,409	659,084	859,891
Motors, incl. parts	201,085	1,423,086	1,993,288
Convertors; transformers; rectifiers	121,728	1,345,463	1,266,384
Switchgear and switchboards (other than telegraph and telephone)	191,183	1,138,561	1,634,850
Bulbs, arc lamps and tubes for electric lighting, complete	111,326	688,941	876,643
Cathode ray tubes, complete	18,321	407,931	270,687
Transistors (incl. photo-transistors), complete	133,775	841,317	759,068
Other, complete	164,331	1,931,768	2,035,893
Parts (excl. glass bulbs)	66,584	789,930	660,494
Radio receiving sets, domestic or portable	142,401	351,141	785,291
Radio communication and navigational aids	797,094	3,431,471	4,266,588
Other radio and TV apparatus, parts and accessories	422,748	3,108,764	3,606,029
Telegraphy and telephony apparatus	146,896	453,103	623,602
Welding machinery	55,094	496,410	808,277
Electrical cooking and heating apparatus	165,051	1,311,024	1,746,834
Magnetos, ignition, and electric appliances for aircraft, motor vehicles and cycles	319,296	2,456,234	2,569,482
Instruments, commercial	123,592	646,322	924,094
Electro-medical apparatus (incl. X-ray apparatus)	85,630	782,695	1,027,263
Portable mechanical appliances, electrically operated, complete	148,159	980,017	1,308,895
Parts	55,576	474,861	453,074
Industrial electronic control equipment	125,071	454,008	898,250
Scientific electrical instruments (excl. telegraphic and telephonic)	246,654	1,735,654	1,912,449
Other machinery, apparatus and appliances	1,491,714	8,283,407	10,253,812
TOTAL	5,410,718	34,191,192	41,541,138

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NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 243a, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged

MONDAY, 2nd OCTOBER

Bolton.—Railway Hotel, Trinity Street, 7.45 p.m. A.S.E.E. Bolton Branch. "Electrical Aspects of Lifts," by W. Scholfield.

Bristol.—Gardiner, Sons & Co. I.E.S. Bath and Bristol Centre. Chairman's address.

Cardiff.—South Wales Institute of Engineers, Park Place, 7.30 p.m. A.S.E.E. South Wales Branch. "Protective Equipment for Industrial Plant," by Dr. W. L. Stern.

Cheltenham.—Belle Vue Hotel, 7.30 p.m. Society of Instrument Technology, Cheltenham Section. "Automatic Control in the Manufacture of Paper," by R. C. Gardner.

Ilford.—Angel Hotel, Ilford Broadway, 8.15 p.m. A.S.E.E. South Essex Branch. "Public Space Lighting," by W. S. Whitaker.

Leeds.—Great Northern Hotel, 7.30 p.m. A.S.E.E. Leeds Branch. "Fire and Burglar Alarms," by G. E. Martin.

London.—Tudor Room, Caxton Hall, S.W.1, 6.30 p.m. Electrical Power Engineers' Association, London Technical Group. "Standardisation of Control Facilities on the British Grid," by P. F. Gunning.

Sheffield.—Royal Victoria Hotel, 7.30 p.m. A.S.E.E. Sheffield Branch. "Photo-electric Cells as applied to the Electrical Industry," by R. Brown.

Southport.—Southport and Ainsdale Golf Course and Hillside Golf Course. Electrical Industries National Golf Championship Finals.

TUESDAY, 3rd OCTOBER

Birmingham.—James Watt Memorial Institute, Great Charles Street, 6.30 p.m. Institute of Metal Finishing, Midland Branch. Papers on copper, nickel, lead alloy and titanium anodes, by R. Fyfe, T. Raynor, J. Corfe and A. C. Wood respectively.

Bristol.—Grand Hotel, 8 p.m. A.S.E.E. Bristol and West of England Branch, Graduate Section. Chairman's address, "Design and Estimating of Electrical Installations," by T. M. Dickason.

Cardiff.—Park Hotel, 10 a.m. Combustion Engineering Association, Western Region. "The Factories Acts in Relation to Boilers and Pressure Vessels," by H. Entwistle.

London.—Savoy Hotel, 12.15 for 1 p.m. Gauge and Tool Makers' Association. Luncheon.

Eltham Green School, Queenscroft Road, S.E.9, 7.45 p.m. A.S.E.E. South East London Branch. "Heat Pumps," by Miss M. V. Griffith.

White Hart, 49, King's Road, Chelsea, S.W.3, 7.45 p.m. A.S.E.E. West London Branch. "Recent Developments in the Electricity Supply Industry," by M. R. G. Paice.

Reading.—Caversham Social Club, Caversham, 7.30 p.m. A.S.E.E. Reading and Districts Branch. "Electrical Traction," by T. Bingham.

TUESDAY, 3rd to FRIDAY, 6th OCTOBER

Scarborough.—Association of Public Lighting Engineers. Conference and Exhibition.

North Berwick.—Marine Hotel. Electrical Wholesalers' Federation, Scottish Section. Annual gathering.

TUESDAY, 3rd to WEDNESDAY, 11th OCTOBER

London.—Olympia. Business Efficiency Exhibition.

TUESDAY, 3rd to THURSDAY, 12th OCTOBER

London.—Olympia. Computer Exhibition and Conference.

WEDNESDAY, 4th OCTOBER

Birmingham.—A.S.E.E. Wolverhampton and District Branch. Visit to Associated Electrical Industries, Ltd., Blackheath.

Cardiff.—Welsh College of Advanced Technology, 6.30 p.m. British Institution of Radio Engineers, South Wales Section. "The S.E.C.A.M. Colour Television System," by G. B. Townsend.

Eastleigh.—Eastleigh Technical College, Chestnut Avenue, 7.30 p.m. British Institution of Radio Engineers, Southern Section. "The Plant Engineer and Work Study."

Edinburgh.—Y.M.C.A., 14, South St. Andrew Street, 6.15 p.m. I.E.S. Edinburgh Centre. "The New I.E.S. Code," by R. Croft.

Glasgow.—Grand Hotel, Charing Cross, 7.30 p.m. Institute of Metal Finishing, Scottish Branch. "Modern Polishing Methods," by F. W. Anderson.

Leicester.—Grand Hotel, 7.30 p.m. Institution of Plant Engineers, Leicester Branch. "Television in Industry," by F. L. Valder.

London.—Wood Green Civic Centre, N.22, 8 p.m. A.S.E.E. North London Branch. "Electrical Aids to Labour-Saving in the Home," by Miss Lois Stevens.

Luton.—Skefco Ball-bearing Co., Ltd. A.S.E.E. Luton Branch. Visit.

Manchester.—North Western Electricity Board Service Centre Theatre, Town Hall Extension, St. Peter's Square, 7.30 p.m. A.S.E.E. Manchester Branch. "Safety in the Utilisation of Electricity," by S. J. Emerson.

Nottingham.—Sherwood Room, County Hotel, Theatre Square, 7 p.m. Institution of Plant Engineers, East Midlands Branch. Address by the chairman, W. K. Martin.

Portsmouth.—C.E.G.B. Offices, 111, High Street, 6.30 p.m. I.E.E. Southern Centre. Chairman's address, by T. G. C. Harrop.

Preston.—Farmer's Arms Hotel, Market Street, 7.30 p.m. A.S.E.E. Preston Branch. "Motor Vehicle Electrical Equipment."

Swansea.—Demonstration Theatre, South Wales Electricity Board, Kingsway, 6 p.m. I.E.S. Swansea Group. Chairman's address.

WEDNESDAY, 4th to FRIDAY, 6th OCTOBER

Brighton.—National Society for Clean Air. Exhibition.

THURSDAY, 5th OCTOBER

Bournemouth.—Grand Hotel, 6.30 p.m. I.E.E. Southern Centre, Graduate and Student Section. Chairman's address, by S. A. Frampton.

Brighton.—Cricketers' Hotel, Black Lion Street, 7.30 p.m. A.S.E.E. Brighton, Hove and District Branch. "The Police."

Chelmsford.—Social Hall, Crompton Parkinson, Ltd., 7.30 p.m. Chelmsford Engineering Society. Presidential address.

Enfield.—A.S.E.E. East Anglia (Thetford) Centre. Visit to rolling mills and cable works, Enfield-Standard Power Cables, Brimsdown.

Glasgow.—Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, 6.30 p.m. I.E.S. Glasgow Centre. "The New I.E.S. Code," by R. Croft.

London.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Presidential address by G. S. C. Lucas.

Manchester.—Staff Canteen, Ferranti, Ltd., Hollinwood, 7.30 p.m. Institute of Metal Finishing, North West Branch. "Atoms and Ions," by J. Fullwood.

College of Technology, 7 p.m. British Institution of Radio Engineers, North Western Section. "Basic Principles of Digital Computers."

THURSDAY, 5th and FRIDAY, 6th OCTOBER

London.—British Electrical and Allied Manufacturers' Association. Export Conference.

FRIDAY, 6th OCTOBER

Cheltenham. — North Gloucestershire Technical College, 7 p.m. British Institution of Radio Engineers, South Midlands Section. "Colour Television," by P. S. Carnt.

Fawley.—Room 4a, Administration Building, Esso Petroleum Co., 5.45 p.m. Society of Instrument Technology, Fawley Section. "Instrumentation in the Paper Industry," by H. Wigman.

Liverpool. — M.A.N.W.E.B. Industrial Development Centre, Paradise Street, 7.30 p.m. A.S.E.E. Liverpool and District Branch. "Applications and Failures of Ball and Roller Bearings," by R. W. Jones.

London.—Savoy Place, W.C.2, 6 p.m. I.E.E. Medical Electronics Discussion Group. Discussion on "What is pH and its Measurement?" to be opened by Dr. G. Mattock and G. R. Taylor.

Pepys House, 14, Rochester Row, Westminster, S.W.1, 7 p.m. Junior Institution of Engineers. "Lighting Effects of the Palace in Kuwait," by R. W. Shaw.

Malvern.—Winter Gardens, 7 p.m. British Institution of Radio Engineers, South Midlands Section. "Transistor Portables," by R. A. Lampitt.

Foundry Conference

Leaders of the foundry industry from all parts of Britain are expected to attend a two-day conference on "Electricity in the Foundry" at the Wulfrun Hall, Wolverhampton, on Tuesday and Wednesday, 10th and 11th October. The conference is being arranged by the Wolverhampton Area of the Midlands Electricity Board with the support of the Institute of British Foundrymen, the British Cast Iron Research Association and the National Foundry College, whose premises in Stafford Street, Wolverhampton, will be visited by the delegates. At the first session, Dr. A. G. Robiette will present a paper on "Arc Furnaces" and Mr. R. O. L. Clarke another on "Induction Furnaces." The afternoon session will be devoted to a paper on industrial electricity tariffs by Mr. A. E. Savage (M.E.B.).

On the Wednesday there will be papers on "Malleabilising Furnaces" by Mr. T. R. Brown; "Materials Handling and Automation in the Foundry," by Mr. L. Landon Goodman; and "Amenities in the Foundry," by Miss M. Brand, H.M. Superintending Inspector of Factories.

Financial Section

STOCKS and SHARES

THERE was not a great deal in the half-yearly results published on the same day by Associated Electrical Industries and Vickers to attract interest back into the industrial markets of the Stock Exchange. In the case of the A.E.I. figures for the six months up to the end of June, there was favourable comment upon the improvement in turnover to £103·5 million, as compared with £101·9 million in the same half of 1960, and in the net profit (before tax) to £4·79 million, against £4·49 million. Satisfaction was modified, however, by the warning that although the interim dividend payment is being maintained at 5 per cent (equal to last year's two quarterly payments) it is not to be assumed that the total will again be brought up to the 15 per cent which was paid for 1960 and was barely covered by the earnings of that year.

A.E.I. and Vickers

Vickers' interim statement showed a material increase in sales during the first half of the year, but only a small improvement in the net profit, at £4·71 million, despite the fact that the comparable figure for last year was struck after a special provision of £1½ million for aircraft development. Net earnings for the full twelve months are expected by the directors to differ little from those of 1960, which gave rather less than twofold cover for the 10 per cent dividend. Prices of both A.E.I. and Vickers £1 shares were marked down by more than two shillings after these announcements. On the basis of the last dividends, the approximate yields are now respectively 8¾ and 6½ per cent.

Mixed Changes

In sympathy with the decline in A.E.I. shares, English Electric fell further to 28s 3d and G.E.C. to 26s 3d. The same tendency was seen in Head Wrightson and other heavy engineering issues. B.I.C.C. were also reactionary at 57s 6d. On the other tack, the most remarkable feature was again the strength of Dimplex, which rose still further to 83s 9d under the influence of the financial results published earlier. E.M.I. moved erratically around 36s 9d in advance of the final dividend declaration. A further recovery of 4s 6d, to 48s, in Hoover was notable and good improvements were recorded elsewhere in Thorn Electrical and Dewhurst.

Advance Components

An interim statement from Advance Components reports that expansion is being maintained at the remarkable rate which accounts for the fact that the value of the 5s shares has multiplied several times over since they were brought to the market two years ago, and also for their quotation, at 29s on a yield basis under 2½ per cent. Last year profits improved by 75 per

Price Changes in

Company or Board	Nom. Value	Middle price 25th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1961 Highest	1961 Lowest
						£ s d		
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	71		3	3	4 4 6	75½	70½
Brit. Elec. 1974/77	100	66		3	3	4 11 0	70½	64½
Brit. Elec. 1976/79	100	68½		3½	3½	5 2 3	73½	67
Brit. Elec. 1974/79	100	75½		4¼	4¼	5 12 6	82	75
Brit. Elec. 1967/69	100	87		4½	4½	5 3 6	91½	86
Overseas Electric Supply								
Calcutta Elec.	£1	21/-		7†	7½†	11 12 0	23/3	20/6
East African Power	£1	13/9		8	10	14 11 0	15/-	13/-
Nigerian Elec.	£1	16/6	−3d	10	14	17 0 0	19/9	15/6
Perak Hydro-Elec.	£1	21/3		10	10	9 8 3	23/6	17/6
Electrical Shares								
Aberdare Holdings	5/-	14/9		17½	17½	5 18 9	17/-	14/3
Aerialite	1/-	4/9		54	54	11 7 0	8/-	4/6
Allen, W. H.	£1	28/9	−6d	14	10*	6 19 3	42/6	28/9
Allied Insulators	5/-	8/6	+6d	20	10*	5 17 9	10/-	8/-
Alwyn Holdings	5/-	21/3	+9d	12½	15‡*	3 10 6	22/3	16/6
Anglo-Portuguese Tel.	£1	20/-		9	9	9 0 0	25/-	18/9
Arcolectric	1/-	4/9		15	15	3 3 3	6/-	3/9
Aron Meters	5/-	20/-		15	15	3 15 0	20/-	17/-
Assoc. Elec. Ind. Ord.	£1	34/6	−2/9	15	15	8 14 0	48/6	34/6
Automatic Tel. & El.	5/-	17/-	+1/3	17	17	—	20/-	12/9
Babcock & Wilcox	£1	25/3	−6d	9	9	7 2 6	36/6	25/3
Bakelite	10/-	46/3		17½	17½*	3 15 9	60/-	42/-
Baldwin, H. J.	2/-	1/-	−3d	10	Nil	—	1/9	1/3
Berry's Electric	5/-	53/9	+3d	30	33⅓*	3 2 0	53/9	37/-
Bowthorpe Holdings	2/-	7/9		18½	22	5 13 6	10/3	7/9
Brit. Elec. Resistance	2/-	7/-		17½	17½*‡	5 0 0	8/9	6/6
Brit. Elec. Traction: Def. Ord. "A"	5/-	50/3		40	50	4 19 6	57/6	41/9
British Electronic Ind.	5/-	10/9		—	15	6 19 6	15/3	8/9
B.I. Callender's	£1	57/6	−1/6	13½	13½	4 13 9	62/3	49/6
B.I. Callender's 6% Pref.	£1	16/6		6	6	7 5 6	18/3	16/6
British Thermostat	5/-	33/-	+3/-	20	27½	4 3 3	40/-	28/-
Brook Motors	10/-	52/6		25	25*	4 15 3	55/-	47/-
Bulgin, A. F.	1/-	12/3	−9d	55	40*	3 5 3	13/3	7/9
Bulpitts	5/-	17/9		15	16½	4 11 6	27/6	16/9
Burco Dean	5/-	6/6		18	15	11 10 9	11/9	6/3
Cable & Wireless	5/-	17/3		10	10*‡	2 18 0	19/9	12/6
Cambridge Instruments	5/-	32/-		12½†	22	3 8 9	38/6	30/-
Chloride El. Storage "A"	£1	80/-	−2/-	17½	20	5 0 0	91/-	72/-
Clarke Chapman	£1	38/3	+3d	13¾	13¾	7 3 9	54/-	37/6
Clarke, T.	2/-	4/-		16	16	5 6 9*	5/3	3/6
Combined Elec. Mfrs.	4/-	7/-		—	12½	7 2 9	10/-	6/9
Contactor Switchgear	5/-	13/-		14	14	5 7 9	16/-	12/9
Cossor, A. C.	5/-	7/3		Nil	Nil	—	8/-	5/6
Crabtree	10/-	24/-		20	12½*	5 4 3	33/9	24/-
Crompton Parkinson	5/-	12/-	−3d	14	12½*	5 4 3	14/6	11/3
De La Rue	10/-	53/-	−9d	22½	22½*	4 5 0	70/-	51/-
Decca "A"	10/-	60/9		20	23½	3 17 0	70/-	52/3
Desoutter	5/-	56/3	+1/3	30	35	3 2 3	68/9	49/-
Dewhurst	2/-	5/6	+1/-	20	20	3 12 9*	6/6	3/9
Dictograph Tel.	2/-	10/6	+3d	20	20*	3 16 3	13/-	8/6
Dimplex	5/-	83/9	+2/6	30	35*	2 1 9	84/-	47/-
Dubilier Condenser	1/-	2/3		30	15*	6 13 3	3/-	2/-
Duport	5/-	11/3	−3d	17½	20	5 18 6*	17/-	11/-
E.M.I.	10/-	36/9	+1/6	20	17½*	4 15 3	51/3	35/3
Eleco	2/-	8/-	−3d	20	20*‡	5 0 0	10/6	4/3
Electrical Apparatus	5/-	18/-		14½	20	5 11 0	21/-	17/-
Electrical Components	5/-	8/9	+3d	11½	12½	7 2 9	9/9	7/9
Elec. Construction	£1	22/6		9	5	4 9 0	39/-	20/3
Elliott-Automation	5/-	33/9	−3d	9·3	13	1 18 6	37/6	25/6
Enfield Rolling Mills	£1	38/-		15	15	7 18 0	51/6	38/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

cent and in the first half of the current period they are now shown to have risen at almost the same pace, by comparison with the same six months of 1960. For the whole of the latter year dividends totalled the equivalent of 13⅓ per cent on present capital, and the current interim payment is being raised in effect from 5 to 6 per cent.

High Yielders

Net profits of Christy Bros. were fully doubled at £101,000 (before tax) in the year ended last March, and taking into account also the higher productivity from which shareholders had derived little benefit in previous years, the directors felt justified in raising the dividend from 8 to 10 per cent. Turnover was said by the chairman to have improved by 20 per cent on the previous record figures and he reported that on the whole the order books remained at a high level. At 24s 6d the £1 shares yield over 8 per cent on a dividend covered more than three times by the latest earnings. There is a yield of over 7 per cent on the 5s shares of Electrical Components at 8s 9d. This year's dividend is being raised from 11½ to 12½ per cent, with more than twofold cover by profits which were approximately maintained in 1960–61 at the previous year's level.

Electrical Investments

Company or Board	Nom. Value	Middle price 25th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1961 Highest	1961 Lowest
Electrical Shares—continued						£ s d		
English Electric	£1	28/3	−1/-	10	10	7 1 6	40/9	28/3
English Electric 3¾% Pref.	£1	9/9	−3d	3¾	3¾	7 13 9	11/9	9/9
Ericsson	5/-	29/3	+2/6	13†	13†	—	32/-	22/3
Ever Ready	5/-	38/-		20	22½	2 19 3	40/-	31/6
Falk Stadelmann	£1	21/9	−9d	10	7½	6 18 0	26/-	21/9
G.E.C.	£1	26/3	−2/6	10	10	7 12 6	39/6	26/3
G.E.C. 6½% Pref.	£1	16/6		6½	6½	7 17 6	19/3	16/6
General Cables	5/-	4/9		15	Nil	—	6/3	4/9
G.H.P. Group	£1	21/-		6	7‡	6 13 3	24/6	17/-
Goblin (B.V.C.)	5/-	4/6		12½	10	11 2 0	8/6	4/3
Hackbridge Holdings	5/-	6/-		20	10*	8 6 9	6/9	5/-
Harland Engineering	5/-	13/3		16	16	6 0 9	19/-	13/3
Head Wrightson	5/-	22/6	−1/-	14	16	3 11 0	30/-	22/-
Heatrae	2/-	13/9		12½	25	3 12 9	19/-	12/6
Holophane	5/-	14/6	−1/6	26	30	10 6 9	20/6	14/6
Hoover	5/-	48/-	+4/6	90	45*	4 13 9	55/6	37/6
Hunt, A. H.	4/-	17/6	−6d	20	20	4 11 6	25/9	17/6
Intl. Combustion	5/-	23/3	−6d	30	30	6 9 0	33/9	23/3
Intl. Computers & T.	£1	91/6		10	11½	2 9 3	107/-	59/-
Johnson & Phillips	£1	21/6		Nil	5	4 13 0	24/-	17/6
Kenwood Mfg.	1/-	4/-		—	—	—	6/-	4/-
Laurence Scott	5/-	14/3		15	15	5 5 3	18/9	14/3
Lister, R. A.	£1	50/-		14	14	5 12 0	56/9	45/6
Lucas, J.	£1	53/-		12½	13¾	5 3 9	71/6	52/6
Marryat & Scott	2/-	16/9	−3d	27½	32½	3 17 6	18/6	13/9
Mather & Platt	£1	37/6		11	11	5 17 3	51/6	37/6
Metal Industries	£1	55/6	−1/6	15	15	5 8 0	66/6	50/-
Midland Elec. Mfg.	£1	58/-	+6d	12	12	4 2 9	67/6	57/6
Murex	£1	41/-	+1/-	20	13*	6 6 9	51/6	39/3
Newman Ind.	2/-	7/-		12½	15	4 5 9	7/6	5/-
Oldham & Son	1/-	2/9		17½	17½*	6 7 3	3/-	2/3
Parsons, C. A.	£1	49/6		9⅜	12½	5 1 0	72/6	46/9
Philips' Lamps	Fl.10	200/-		16	16*	1 12 0	£13½	£9¾
Plessey	10/-	40/-	+3/3	17	15*‡	3 15 0	45/-	35/3
Pullin Group	2/-	11/3	−3d	25	25	4 9 0	15/-	11/3
Pyrotenax	5/-	55/-		40	45	4 1 9	65/-	46/6
Radiation	£1	24/-	+3d	12	10	8 6 9	37/6	23/6
Reliance-Clifton	5/-	18/9		15	20	3 11 6	22/-	14/9
Reyrolle	£1	39/3	−9d	17½	9¾*	4 19 6	51/6	36/6
Richardsons Westgarth	10/-	4/3		8⅓	Nil	—	8/3	4/3
Sangamo Weston	10/-	21/9	+9d	13⅓	10‡*	4 12 0	25/9	18/9
Scott, James	5/-	30/-		25	27½	4 11 9	32/-	25/6
Simon Engineering	5/-	37/6		—	27½	3 13 3	43/9	28/-
Smith (England), S.	4/-	14/6		17½	20	5 10 3	23/9	14/6
Southern Areas	£1	17/6		5	6	6 17 3	23/-	14/6
Strand Elec.	5/-	18/3		14·6	20	5 9 6	20/-	12/3
Sturtevant	5/-	10/3		15†	13†	10 6 0	18/6	10/3
Sun Elec.	5/-	15/-		15	18½	6 3 3	17/6	15/-
T.C.C.	10/-	41/3		35	22½*	5 9 0	43/9	40/-
Telephone Rentals	5/-	26/3	+3d	15	15‡*	2 17 3	29/6	18/6
Thompson (John)	5/-	13/9		20	5	—	16/9	13/9
Thorn Elec.	5/-	56/-	+1/6	25	25	2 4 9	63/-	44/6
Thornycroft	4/-	5/-		6	6	—	7/-	5/-
Tube Investments	£1	63/9	+1/3	—	14	4 7 9	85/-	62/-
Ultra Electric	5/-	24/6	−6d	20	25	—	31/3	12/6
Walsall Conduits	4/-	10/6	−3d	15	15	5 14 3	15/-	10/6
Ward & Goldstone	5/-	28/9		35	17½*	3 0 9	36/6	25/6
Watford	2/-	7/-	+3d	25	20*	5 14 3	10/9	6/9
Westinghouse	£1	30/6	−1/6	11	11	7 4 3	45/-	30/6
West, Allen	5/-	11/-		12½	13½	6 2 6	14/6	10/3
Wilkins & Mitchell	5/-	8/9		21	12	6 17 3	15/3	8/9
Wolf Electric	5/-	13/6		12½	13¾	5 1 9	17/6	13/6

Plessey Issues

Plessey 10s shares are now quoted "ex" the one-for-three scrip issue which is being made as a preliminary to the proposed merger with Ericsson Telephones and Automatic Telephone & Electric. Formal notice of the offer to members of the two telephone companies for the exchange of their shares, plus other considerations, for those of Plessey is expected to go out very shortly. Plessey's intentions are to bring the total distribution for 1960–61 on the older capital to 17 per cent, and to pay 15 per cent for the year ending next June on capital increased by the scrip issue and by the merger plan. This indicates a yield of approximately 3¾ per cent on the Plessey shares, which have been strongly supported of late up to 40s.

Metal Industries

The £1 shares of Metal Industries have been through some sharp fluctuations since the appearance of the full report, but as a net result the present price of about 55s 6d reflects satisfaction with the figures for 1959–60 and with Sir Charles Westlake's review of the group's affairs. He thought it would be agreed that a profit of nearly £2½ million was not unsatisfactory in the circumstances, and showed that since the acquisition of Lancashire Dynamo nearly three-quarters of that profit was coming from the electrical side of the group. He foresaw difficult trading conditions ahead, with special reference to the problem of sharply rising production costs, but at the same time saw in the latter the likelihood of a widespread movement in industry towards better factory equipment, and a continuing demand, therefore, for the schemes of automatic control in which members of the Metal Industries group specialise.

REPORTS and DIVIDENDS

Associated Electrical Industries, Ltd.—Group trading profits amounted to £9·11 million in the first half of 1961, compared with £8·23 million in the corresponding period of last year and with £8·16 million in the second half of 1960. After depreciation and interest of £4·32 million, the group profit in the first six months of this year was £4·79 million, against £4·49 million in the same period of 1960, when £3·74 million was provided for depreciation and interest. An interim dividend of 1s per £1 ordinary unit is declared in respect of 1961, which equals the first two quarterly dividends paid for 1960. The directors state that it should not be assumed that the rate of dividend for the whole year will necessarily be maintained. A total of 3s per unit was paid for 1960.

The value of output, excluding intertrading, was £103·5 million in the six months ended 30th June last, against £101·9 million in the first half of 1960, and £113·4 million in the half-year ended 31st December, 1960. Orders received in the first half of this year, mainly for delivery within three years, totalled £106·6 million. In the corresponding period of 1960 the value of orders was £113·3 million, and in the second half of last year £109·7 million.

Metal Industries, Ltd.—At the annual general meeting last week, the chairman, Sir Charles Westlake, said that though the operating results for the first part of the year showed an improvement over the corresponding months of last year, the coming months were not going to be easy. Whilst orders in hand were at a high level, they were harder to get, following the break-up of price arrangements in the electrical field. All their endeavours were now being directed to a reduction in costs in order to check the steady erosion of profit margins. Side by side with the drive to improve production methods, they were seeking to make their products even better to meet the challenge, not only at home, but also from manufacturers in the countries of the European Common Market. Lancashire Dynamo & Crypto had announced a new range of electric motors designed specifically to meet different national standards.

James Howden & Co., Ltd.—Mr. C. W. Hume, chairman, reports that the inflow of orders during the year to 30th April last was most encouraging. At the present time the order book of the parent company is at the highest in its history. The Scottish factories were fully employed throughout the year and output, both in tonnage and sales value, was a record. Sales in France have been increasing, and Mr. Hume describes that market as promising. A French subsidiary is being formed. A controlling interest has been acquired in a new Dutch company, Holima Ingenieursbureau voor Warmte-en Koudetechniek, established to take over the business of the former agents in Holland.

Bruce Peebles & Co., Ltd., has made an offer for the capital of the Belmos Co., Ltd. The terms are one 6½ per cent cumulative preference share of Bruce Peebles for each of the 75,000 Belmos 6 per cent preference shares and eleven Bruce Peebles 10s ordinary shares for each two of the 248,924 Belmos £1 ordinary shares. Holders of the Bruce Peebles 7½ per cent preference shares will be offered an equivalent number of 6½ per cent preference shares plus two new 6½ per cent preference for each £3 worth of 7½ per cent preference share already held.

A "satisfactory trend" of business is reported by the Bruce Peebles board and the company is now said to be operating at a profit.

Watford Electric & Manufacturing Co., Ltd.—Interim dividend 5 per cent (the same). The chairman says that in spite of the ever-increasing costs which have to be absorbed the first half-year's trading shows an improvement over the corresponding period of the preceding year, and he envisages the maintenance of this trend throughout the current year. Orders remain at a satisfactory level.

Muirhead & Co., Ltd.—Interim dividend 2½ per cent (the same). (Restricted in view of the Chancellor's request.)

British Relay Wireless & Television, Ltd.—Group trading profits increased from £2,474,606 to £3,516,985 in the year ended 30th April, 1961, and the final dividend of 7 per cent on increased capital again makes a total of 17 per cent. After all charges, including higher depreciation, the net profit is reduced to £530,708 (£676,679).

New Companies

Simon-Carves (Export), Ltd.—Registered 14th September. Capital £100. Mechanical, chemical, civil, electrical, constructional or nuclear engineers, etc. Directors: L. Dobson, A. J. Payne, F. P. C. Coker, J. D. Knox, J. H. Magill, R. F. Orme, L. D. Willson and C. L. Thorpe. Secretary: M. S. Phillips. Regd. office: Bird Hall Lane, Cheadle Heath, Stockport, Ches.

G.E.C. (Electronics), Ltd.—Registered 14th September. Capital £100. The subscribers (each with one share) are D. M. Vickers and H. J. Bond, both of Magnet House, Kingsway, W.C.2. The first directors are to be appointed by the subscribers. Solicitors: Herbert Smith & Co., 62, London Wall, E.C.2.

G.E.C. (Engineering), Ltd., G.E.C. (Research), Ltd., G.E.C. (T. & E.) Holdings, Ltd., and G.E.C. (Telecommunications), Ltd.—Particulars similar to G.E.C. (Electronics), Ltd.

E-A Medical Automation, Ltd.—Registered 14th September. Capital £100. To manufacture and deal in automation, control, laboratory and analytical systems, etc. L. C. Upsdell is the first director. Secretary: J. Daltrop. Regd. office: Century Works, Lewisham, S.E.13.

Bridisco, Ltd.—Registered 6th September. Capital £1,000. To acquire the business of British Distributing Co. and to carry on the business of manufacturers of and dealers in electrical apparatus, etc. Directors: B. P. Aldington and Catherine A. Aldington. Secretary: K. E. Davis. Regd. office: 1, Cecil Court, London Road, Enfield.

Francis L. Flinn, Ltd.—Registered 14th September. Capital £1,000. Electrical engineers, etc. Directors: F. L. Flinn and Doris Flinn (secretary). Regd. office: 35, Bishop Street, Coventry.

T. & M. Robertson, Ltd.—Registered 1st September. Capital £2,000. Designers, makers and hirers of sensing, measuring, transducing, transmitting, control and power devices, etc. Solicitors: Latimer, Hinks, Marsham & Little, Darlington.

Abbott & Timbrell Services, Ltd.—Registered 4th September. Capital £3,000. Electrical engineers, etc. Directors: C. Boddington, S. C. Gibson (secretary) and T. G. Walker. Regd. office: 14, Sheep Street, Wellingborough.

Camborne Electrical (Sew-Vac), Ltd.—Registered 29th August. Capital £100. Manufacturers of and dealers in goods, etc. Directors: T. M. Harry and Mrs. Elizabeth U. Harry. Secretary: D. E. G. Wing. Regd. office: 14, Commercial Street, Camborne, Cornwall.

Winding-Up Petition

Davis Bros. (Electrical), Ltd.—A petition for the winding up of the company has been presented in the High Court and is to be heard on 9th October. Anyone wishing to appear should notify Cochrane & Cripwell, 119, Finsbury Pavement, London, E.C.2, by 6th October.

Liquidation

Winding-up proceedings or liquidations are often undertaken for the purpose of reconstruction, the transfer of a business, or other reasons. The appearance of a company's name under this heading therefore does not necessarily indicate insolvency.

M. N. Hunter & Co., Ltd., radio, television and electrical dealers, 20, Nether Hall Road, Doncaster.—Liquidator, Mr. P. Cardwell, 93, Queen Street, Sheffield, 1, appointed by members and creditors on 11th September.

Bankruptcies

E. Middleton, lately carrying on business as an electrical dealer under the style of Home Electrics at 83, Friargate, Preston, Lancs.—Receiving order made 13th September on debtor's petition.

A. Whittall, electrical dealer, 25, Collingwood Street, Barrow-in-Furness.—Public examination 26th October at the Magistrates' Court, Duke Street, Barrow-in-Furness.

W. W. Forbes and **A. C. Poole**, lately carrying on business together in partnership as F.P. Radio Service at 325, Lillie Road, Fulham, London, S.W.6, radio and electrical dealers.—First and final dividend of 4s 2½d in the £ payable 3rd October at Bankruptcy Buildings, Carey Street, London, W.C.2.

TYPE APPROVED

TEXAS SILICON DIODES

READILY AVAILABLE AT LOW COST
FOR USE IN ALL HIGH PERFORMANCE EQUIPMENT

CV7013 CV7040 CV7045 CV7046

Type	Description	Peak Inverse Voltage P.I.V. (V)	Max. Mean D.C. Forward Current @ 25°C (mA)	Max. Reverse Current @ P.I.V. @ 25°C I_R (μA)	Max. Reverse Current @ P.I.V. @ 100°C I_R (μA)
CV7013	Diffused junction silicon diodes housed in the Moly/G*, small hard glass, double ended package	400	400	0·2	20
CV7040		150	200	0·1	10
CV7045		200	400	0·2	15
CV7046		600	400	0·2	25



ACTUAL SIZE

- Suitable for automatic assembly on printed circuits because of standard size and shape, and magnetic leads.
- Special Texas MOLY/G* molybdenum-to-hard glass seal gives extra resistance to severe mechanical shock.
- Long leakage path makes the devices particularly suitable for equipment used in industrial conditions and at high altitudes.
- High thermal conductance of molybdenum heat sink maintains junction at lower temperatures and improves reliability.
- Matched thermal expansion of molybdenum and hard glass envelope eliminates differential heat strain.
- The only range of devices of their kind in mass production in this country—now.

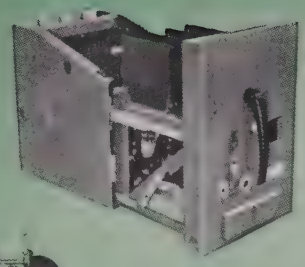
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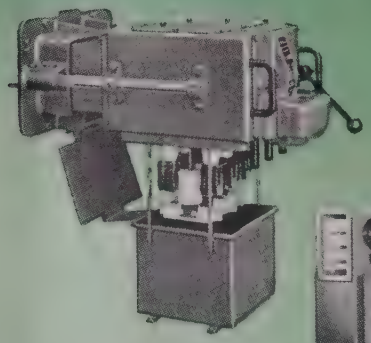
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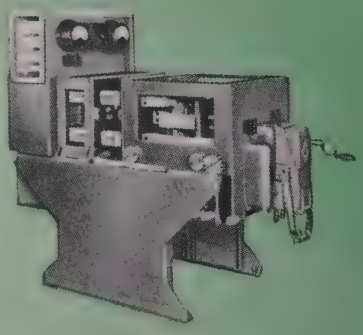
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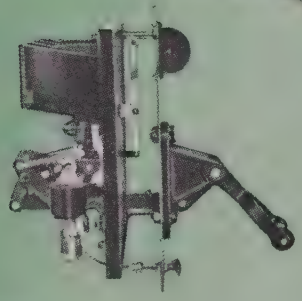
CIRCUIT BREAKERS

for use on LV systems



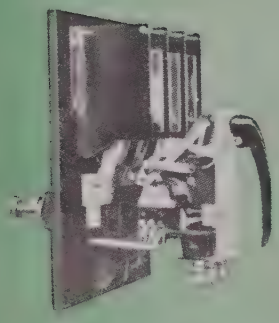


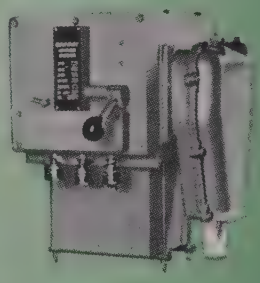




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Dead front—back of panel mounting
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Marine type to Lloyds requirements
DC Traction
Field Breakers with discharge contacts
Horizontal draw-out
Admiralty shock-proof
H.R.C. Types ASTA Certified



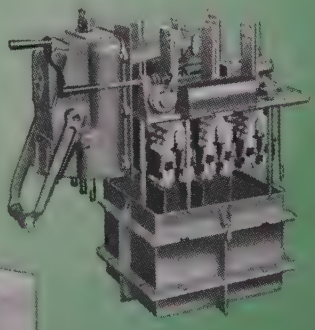


OIL IMMERSED — A C

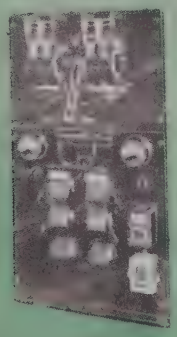
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Industrial Metalclad—non draw-out
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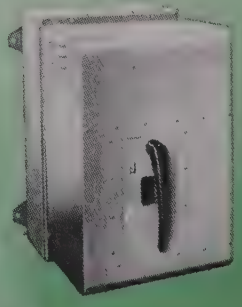
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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1956

34950. A. Reyrolle & Co., Ltd. (State Electricity Commission of Victoria).—Electric switchgear associated with zoned protection. 7th February, 1958. (Cognate application 35076, 16th November, 1956). (877969).

1957

6949. Associated Electrical Industries, Ltd.—A.c. motor circuit arrangements. 3rd March, 1958. (877686.)

7004. Green, N. D.—Metal terminals for attachment to ends of flexible cord and like members. 3rd March, 1958. (877899).

16012. H.R. Electric Motors (Newhaven) Ltd.—Window demisting devices. 20th May, 1958. (878038.) 16013. Electric impeller devices, such as fans, blowers, or extractors. 15th May, 1958. (878039.) 27156. Air conditioning, disinfecting or deodorising devices. 27th August, 1958. (878040).

22526. Associated Electrical Industries, Ltd.—Electrical commutators. 19th June, 1958. (878013).

23131. Plessey Co., Ltd.—Rolled-electrode type electrolytic condensers. 17th October, 1958. (877722).

30671. Ferranti, Ltd.—Electronic counters. 24th September, 1958. (877761).

31165. English Electric Co., Ltd.—Wound magnetic core structures. 30th September, 1958. (Addition to 733718). (877762).

31681. Fimag Finsterwalder Maschinen G.m.b.H.—Synchronous machines. 10th October, 1957. (Addition to 844688). (877836).

32025. Associated Electrical Industries, Ltd.—Power factor measurement. 12th November, 1958. (877621.)

33759. I-T-E Circuit Breaker Co.—Circuit-breakers. 29th October, 1957. (877809).

36303. Fabriek van Electrische Apparaten Vorheen F. Hazemeijer & Co., N.V.—Method for the manufacture of insulating bodies, and insulating bodies obtained by the application of this method. 21st November, 1957. (877689.)

38229. Associated Electrical Industries, Ltd.—Mounting arrangements for electrical components. 29th November, 1958. (877991).

38372. Soc. d'Electronique et d'Automatisme.—Electroluminescent devices. 10th December, 1957. (877931).

1958

107. Rodale Mfg. Co., Inc.—Push button electric switches. 1st January, 1958. (877690).

10457. Associated Electrical Industries, Ltd.—Mounting arrangements for electrical components. 20th November, 1958. (Divided out of 877991). (877992).

10860. Philips Electrical Industries, Ltd.—Methods of and apparatus for producing semiconductor devices. 3rd April, 1958. (877973).

14077. Mefina S.A.—Apparatus for converting electric signals into mechanical movements of an output element of apparatus with power amplification. 2nd May, 1958. (877907).

15874. Willem Smit & Co.'s Transformatorenfabriek, N.V.—Transformers and choking coils. 16th May, 1958. (877765).

18161. Osterreichische Studiengesellschaft Für Atomenergie G.m.b.H.—Method of separating electrically charged particles. 6th June, 1958. (878042).

21995. Emmco Development Corporation.—Method and apparatus for electric welding. 9th July, 1958. (877914).

30092. General Electric Co., Ltd.—Electrical counting circuits incorporating junction transistors. 3rd September, 1959. (877768).

32932. A.M.P., Inc.—Electrical connectors. 28th September, 1959. (877616).

33428. Associated Electrical Industries, Ltd.—Protective devices for electrical equipment. 12th October, 1959. (877694).

36048. Associated Electrical Industries, Ltd.—Electrical oscillators. 3rd December, 1959. (877037.)

37932. General Electric Co., Ltd.—Refrigerators. 25th November, 1959. (877274.)

1959

904. General Electric Co., Ltd.—Mounting arrangements for air-cooled semiconductor rectifiers. 6th January, 1960. (877276.)

1679. Regulator A.G.—Electronic temperature control circuit. 16th January, 1959. (877012.)

2168. General Electric Co., Ltd.—Slurries for use as breeding materials in nuclear reactors. 23rd December, 1959. (877337.)

5354. Associated Electrical Industries, Ltd.—Automatic telephone systems. 5th February, 1960. (877516.)

17137. Westinghouse Electric Corporation.—Electric control systems. 20th May, 1959. (877440.)

18288. General Electric Co., Ltd.—Electric apparatus of the kind including grid-controlled thermionic valves. 20th May, 1960. (877019.)

18389. General Electric Co., Ltd.—Devices for wrapping and unwrapping wrapped connections. 25th May, 1960. (877160.)

21686. Siemens & Halske A.G.—Production of semiconductor material. 24th June, 1959. (877469.)

21943. Racal Engineering, Ltd.—Radio receivers. 22nd June, 1960. (877040.)

23401/2. Ferranti, Ltd.—Direct viewing cathode-ray storage tubes. 7th July, 1960. (877517/8.)

1961

4902. Associated Electrical Industries, Ltd.—Electronic equipment. 4th December, 1957. (Divided out of 877481.) (877482.) 4903. Electronic equipment. 4th December, 1957. (Divided out of 877481.) (877483.)

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to the dates stated:—

13th October

Freez-A-Matic. No. 819,066. Class 11. Refrigerating installations and apparatus.—Refrigerator Equipment Co. (London), Ltd., 81, Hoe Street, Walthamstow, London, E.17.

Triangular design. No. B820,142. Class 11. Air-purifying and ventilating apparatus; and electrical installations for lighting, heating, cooking, refrigerating and drying.—Insulated Appliances, Ltd., 216, Rowan Road, Streatham Vale, London, S.W.16.

Abacus. No. 821,829. Class 11. Ceiling light diffuser panels made of plastics and with metal rims.—Morris Research Design, Ltd., 8a, Westminster Road, Hanwell, London, W.7.

20th October

Dirigent. No. 814,008. Class 7. Electrical machines for agricultural purposes. No. B814,009. Class 9. Loudspeaker intercommunication telephone systems.—Standard Telephon und Telegraphen Akt.-Ges. Czeija, Nissl & Co., Vienna, Austria. Address for service: E. B. Robinson, Therese House, 29-30, Glasshouse Yard, Aldersgate Street, London, E.C.1.

Indesit. No. 814,313. Class 7. Clothes washing and dish washing machines.—Indes Ind. Elettrodomestici S.p.A., Turin, Italy. Address for service: Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

W and whirlpool design. No. 820,597. Class 7. Washing, drying, ironing, drycleaning, food waste disposal and polishing machines. No. 820,598. Class 9. Electric flat-irons, vacuum cleaners and domestic polishing machines. No. 820,599. Class 11. Water heaters, water softeners, refrigerators, freezers, ice-cube making apparatus, air conditioning installations, electric and gas ranges and incinerators.—Whirlpool Corporation, U.S.A. Address for service: J. A. Kemp & Co., 14, South Square, Gray's Inn, London, W.C.1.

H and **Honeywell.** No. 781,377. Class 9. Electrical, electronic and pneumatic apparatus and installations for the automatic control and supervision of industrial operations and of heating, ventilating and air-conditioning installations; micro-switches, temperature indicators and regulators; and indicating, recording and measuring instruments. **Visicorder.** No. 815,165. Class 9. Scientific electrical and electronic apparatus.—Minneapolis-Honeywell Regulator Co., U.S.A. Address for service: Lloyd Wise, Bouly & Haig, 10, New Court, Lincoln's Inn, London, W.C.2.

Six-pointed design. No. 802,464. Class 9. Scientific and electrical apparatus and instruments; electrodes and arc welding apparatus; and electric soldering irons.—Gesellschaft für Linde's Eismaschinen Akt.-Ges., Wiesbaden, Germany. Address for service: G. F. Redfern & Co., Redfern House, Dominion Street, London, E.C.2.

Prova. No. 812,298. Class 9. Electric irons, wire, domestic utensils, batteries, bells, etc. No. 812,297. All goods included in Class 11. No. 812,364. Class 17. Electrical insulating materials.—British Home Stores, Ltd., Marylebone House, 129-137, Marylebone Road, London, N.W.1.

Indox. No. 815,891. Class 9. Ceramic magnets.—Indiana General Corporation, U.S.A. Address for service: Pollak, Mercer & Tench, Audrey House, Ely Place, London, E.C.1.

Triorama. No. 820,679. Class 9. Apparatus for recording, reproducing and amplifying sound.—Television & Electrical Distributors (Proprietary), Ltd., Johannesburg, South Africa. Address for service: Frederick J. Cleveland, 302-6, Bank Chambers, 329, High Holborn, London, W.C.1.

Securitone. No. 812,401. Class 10. Electrical and electronic medical, surgical and veterinary apparatus.—Securitone Corporation of America. Address for service: Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

Atlas Trufocus. No. 800,683. Class 11. Lamp bases, holders and sockets.—Thorn Electrical Industries, Ltd., Thorn House, Upper St. Martin's Lane, London, W.C.2.

Copelaweld. No. 814,495. Class 11. Refrigerating apparatus for use in conjunction with motor compressor units contained in welded metal casings.—Copeland Refrigeration Corporation, U.S.A. Address for service: J. A. Kemp & Co., 14, South Square, Gray's Inn, London, W.C.1.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Aberdare.—U.D.C. 20th October. Street lighting installation at new housing estate, Maesgwyn, Cwmdare. (See Classified Advertisement Section.)

Australia.—State Electricity Commission of Victoria. 23rd October. Rectifier units. (E.S.B. 29921/61.)*

Belfast.—City Council. 27th October. 33/11 kV, 7,500 kVA transformers. (See Classified Advertisement Section.)

Burma.—Director General, Posts and Telegraphs. 15th October. Line equipment. (E.S.B. 29925/61.)*

Canada.—Winnipeg Hydro-Electric System. 5th October. Distribution transformers, 100-300 kVA. (E.S.B. 29939/61.)*

Ceylon.—Ministry of Agriculture, Land, Irrigation and Power. 21st October. 1·1 and 11 kV cable. (E.S.B. 29762/61.)*

Transport Board. 25th October. Batteries. (E.S.B. 29792/61.)*

Co. Down.—Education Committee. 16th October. Electrical and lift installations at 18, Windsor Avenue, Belfast. Varming & Mulcahy, consulting engineers, 37, Malone Road, Belfast, 9.

Durham.—County Council. 16th October. Lighting of roundabout near new County Hall, Aykley Heads. (See Classified Advertisement Section.)

Egypt.—Ministry of Public Works. 21st November. 33 kV transmission line between Sibaiya and Qena (140 km). (E.S.B. 29731/61.)*

Formosa.—Central Trust of China. 13th October. Street lighting control switches.

Shihmen Development Corporation. 17th October. Disconnecting switches. (E.S.B. 29749/61/I.C.A.)*

France.—Headquarters, A.F.C.E., Fontainebleau. Cable. (E.S.B. 29949/61.)*

Ghana.—Ghana Government. Television transmitter and studio buildings, two-way intercommunication links, microwave programme links, etc. (E.S.B. 28534/61.)*

Greece.—Ministry of Trade. 17th October. Lighting equipment. (E.S.B. 29750/61.)*

India.—Rajasthan State Electricity Board. 12th October. Radio-telephone equipment. (E.S.B. 29840/61.)*

Iraq.—Ports Administration. 22nd October. Six mobile diesel-electric generating sets. (E.S.B. 29798/61.)* Exhaust fans. (E.S.B. 29803/61.)* Armature wire. (E.S.B. 29783/61.)*

Irish Republic.—Co. Meath Vocational Education Committee. 6th October. Mechanical and electrical installations in new school at An Uaimh. (E.S.B. 29930/61.)*

Manchester.—City Council. 6th October. Laundry machinery, Walton House, Ancoats. City architect, P.O. Box 488, Town Hall.

New Zealand.—G.P.O., Wellington. 25th October. Static power invertor. (E.S.B. 29900/61.)*

State Electricity Department. 6th February, 1962. Four 66/6·35 kV, 10 MVA transformers. (E.S.B. 29916/61.)*

Town Clerk, Wellington. 24th October. Distribution transformers. (E.S.B. 29804/61.)*

Scunthorpe.—Corporation. 20th October. Rewiring of 226 pre-war Council houses, Crosby estate. (See Classified Advertisement Section.)

Senegal.—Ministry of Information. Radio broadcasting equipment. Closing date for tenders postponed to 31st October. (E.S.B. 25293/61.)*

ORDERS PLACED

Glasgow.—Education Committee. Electrical installation work in primary school, Blairdardie (£12,467).—B. French.

Lancashire.—Education Committee. Rewiring of Hindley Green County Secondary School (£3,439).— G. Moss & Sons. Rewiring work at Prescot Further Education Centre (£2,201).—Marsh & Co.

London.—Islington Law and General Purposes Committee. Recommended. Renewal of electrical installations in the Town Hall and Public Hall (£20,288).—London Electricity Board.

Newcastle-on-Tyne.—City Council. Electrical work at Elswick Hall (£1,275).—A. F. Jemison.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Alnwick.—Bus station, Clayport Street; United Automobile Services, Ltd., Grange Road, Darlington.

Ammanford.—Extensions to Technical College (£48,000); Saxon, Smith & Partners, architects, 2, Stanley Street, Chester.

Ayr.—Alterations to store premises, High Street (£100,000); F. W. Woolworth & Co., Ltd., Lord Street, Liverpool.

Billingham-on-Tees.—Second block of shops, Town Square (£100,000); Elder & Lester, architects, Midland Bank Chambers, Town Square, Billingham.

Boston.—Houses (58), Woad Farm estate; borough surveyor.

Brighton.—Factory, Bexhill Road; Jaycee Furniture, Ltd., Century House, Dyke Road.

Burnley.—Bus station (£128,000); borough engineer, 22/24, Nicholas Street.

Cambridge.—New buildings for Christ's College; Denys Lasdun, architect, 3, Albany Terrace, London, N.W.1.

Chester-le-Street.—Cold storage depot at Birtley for the Buxted Chicken Co., Ltd.; Lanchester & Lodge, architects, Woburn Square, London, W.C.1.

Cleckheaton.—Offices and cold store, Scott Lane/Northgate site; Eskimo Food Co., Ltd., East Ardsley, Wakefield.

Colne.—Flats and houses (94), Lob Common; borough engineer, Town Hall, Colne, Lancs.

Croydon.—Church, Tedders Road; H. K. Northover, architect, Ingleden Park Road, Tenterden.

Darlington.—Council chamber and offices, Uplands Road, for R.D.C.; R. Brown, architect, 123, Victoria Road.

Doncaster.—Shops and showrooms on site of Reindeer Hotel, Hall Gate; Town & City Properties, Ltd., Kingsbury House, King Street, London, S.W.1.

Durham. — Museum, Aykley Heads (£35,000); county architect, South Street, Durham.

Epsom.—Four-storey shops and offices on site of Granada Cinema; Industrial Investment Services, 129, Finsbury Pavement, London, E.C.2.

Glasgow.—Maternity unit at Royal Samaritan Hospital for Women (£560,000); Boswell, Mitchell & Johnston, architects, 256, West George Street, Glasgow.

Glossop.—Houses (281), Chapel Lane, Hadfield, for Manchester Housing Committee; director of housing, Town Hall, Manchester, 2.

Harlow.—Factory (£250,000); Universal Postal Frankers, Ltd., Brettenham Road, N.18.

Hastings.—Grammar school; borough surveyor, 37, Wellington Square.

Haverhill.—Offices for U.D.C.; Peter Barefoot, architect, 22, Thorofare, Ipswich.

Hemel Hempstead.—Pavilion for dancing, reception and dining purposes (£266,000); borough engineer, Market Square.

Heston and Isleworth.—Houses and flats (68), Whitton Dene/Hall Road development; borough surveyor, 88, Lampton Road, Hounslow.

Heywood.—Civic centre, Church Street; C. B. Pearson & Son, architects, 24, Loxford Street, Manchester, 15.

Hove.—Flats (78), The Drive; R. Green (Properties), Ltd., 40a, Eaton Place, Brighton.

Leicester.—New City of Leicester Boys' School (£263,835); city architect.

Liverpool.—Fourteen-storey headquarters, Old Hall Street; Littlewoods Mail Order Stores, Ltd., 152a, London Road.

London.—Eight-storey block of flats, Vanbrugh Park, Blackheath; Taylor, Whalley & Spyra, consulting engineers, 103, Portland Street, Manchester, 1.

St. George's R.C. Cathedral School, Lambeth Road, S.W.; F. G. Broadbent & Partners, architects, 13, Manchester Square, W.1.

R.C. primary school, Barry Road, Dulwich; Peter Rycroft, architect, 49, Creffield Road, W.5.

Luton.—Extension to Luton Maternity Hospital (£100,000) for North West Metropolitan Regional Hospital Board; regional architect, 40, Eastbourne Terrace, London, W.2.

Norwich.—Ten-storey blocks of flats, motel, ballroom, shops, etc., as redevelopment of site of Heigham Hall; Shingler & Risdon, architects, 47, Bedford Row, London, W.C.1.

Nunthorpe (Yorks.). — Modern school; Richard, Sheppard, Robson & Partners, architects, 5, Southampton Place, London, W.C.1.

Preston.—Branch library, eight shops and thirteen maisonnettes, Savick; borough surveyor.

Sidcup.—Flats (123) and houses (71), Longlands Nursery estate; New Ideal Homesteads, Ltd., Ashley Road, Epsom.

Southgate.—Showroom and office block, Chase Side; Industrial & Investment Services, Ltd., 129, Finsbury Pavement, E.C.2.

Stockton-on-Tees.—Additions to health department, Yarm Lane, for the T.C. (£19,500); G. Cowan, borough engineer.

Stoke-on-Trent.—Shopping centre at Longton; Ian Fraser & Associates, architects, 15, Bedford Square, London, W.C.2.

Warwick.—Block of offices at rear of Shire Hall (£445,000); county architect, Shire Hall, Warwick.

Weston-super-Mare.—Houses (88), Oldmixon Town; R. G. Lickfold, town clerk, Town Hall.

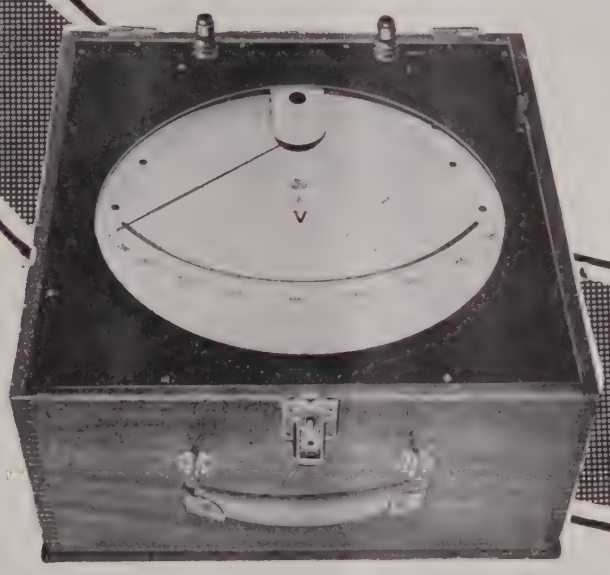
Wimborne.—Factory and offices, Leigh Park; Flight Re-Fuelling, Ltd., Tarrant Rushton, Blandford.

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* This information is extracted from the Board of Trade *Export Service Bulletin.* Inquiries should be addressed to the Board of Trade, Export Services Branch, Lacon House, Theobald's Road, London, W.C.2 (Telephone: Chancery 4411, Ext. 738), quoting the reference given.

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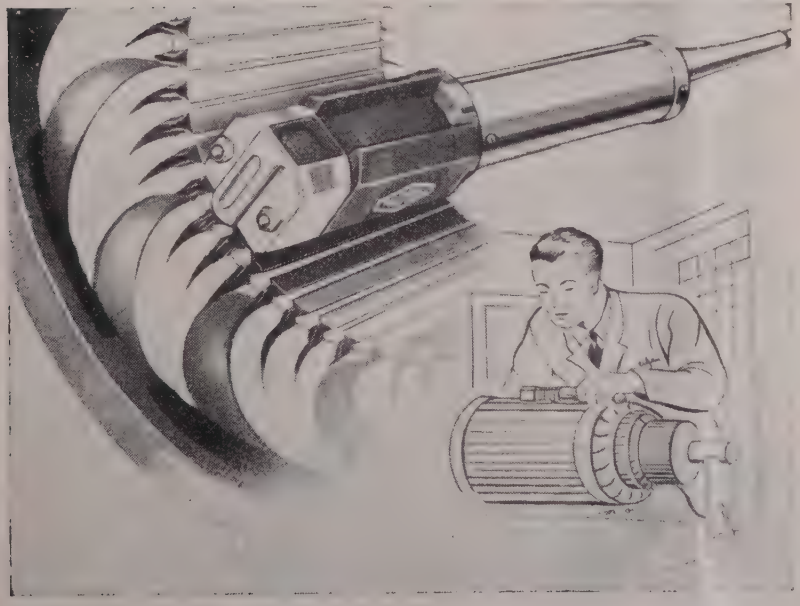
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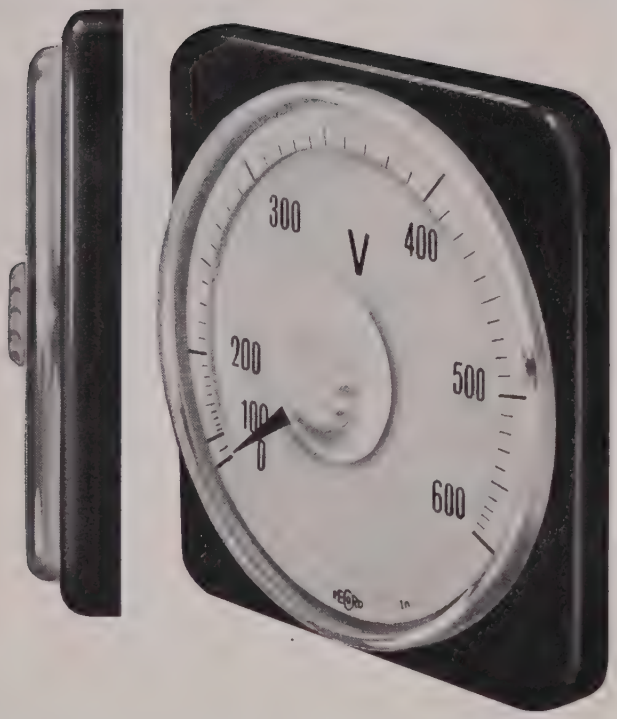
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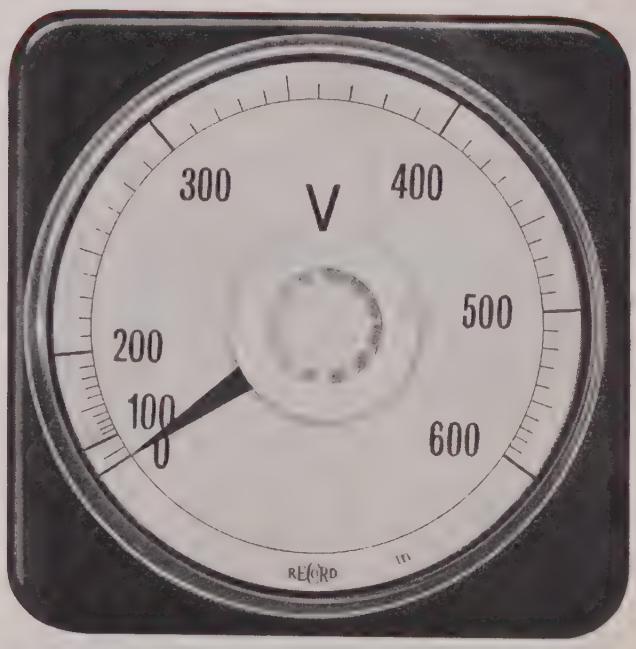
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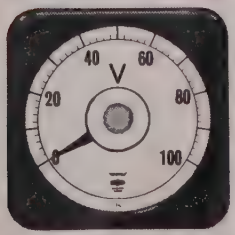


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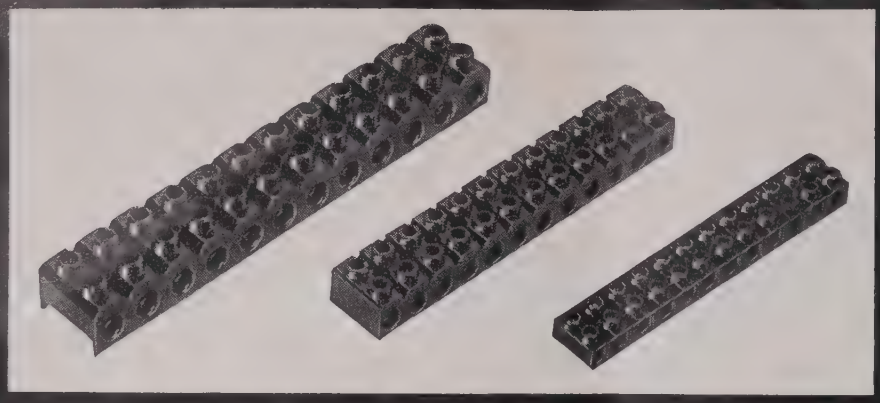
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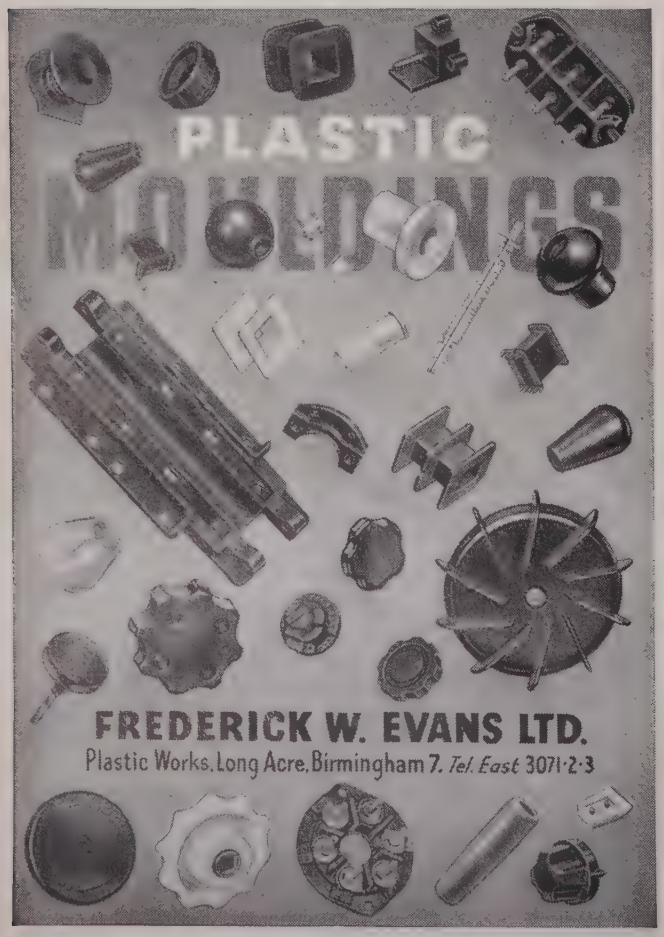
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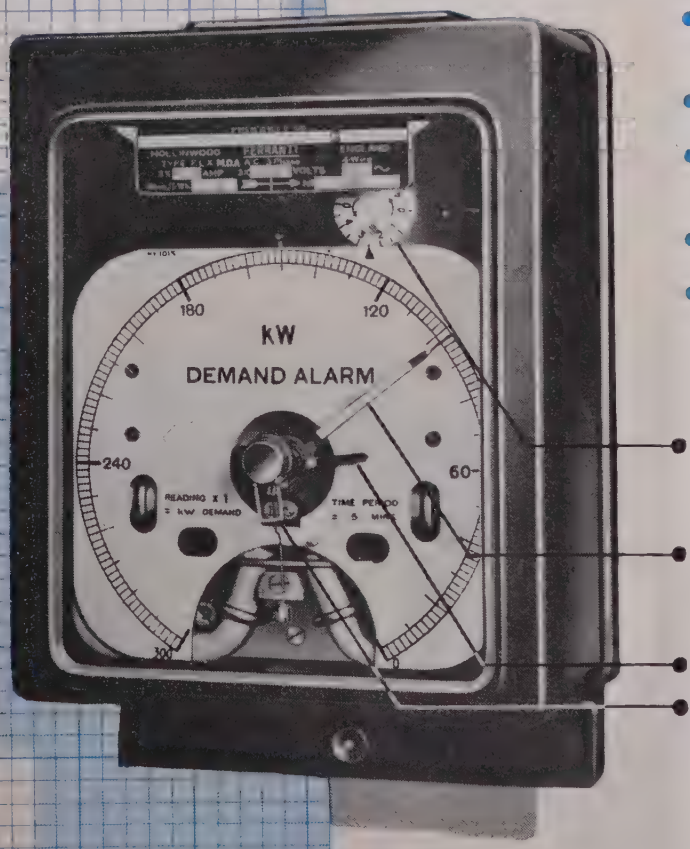
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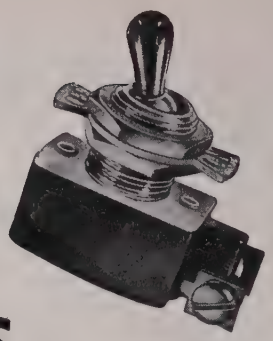
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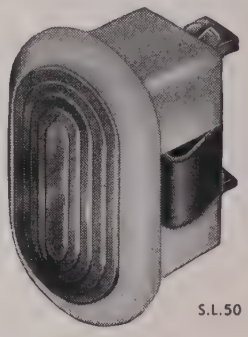
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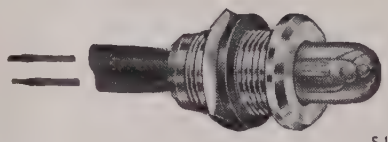
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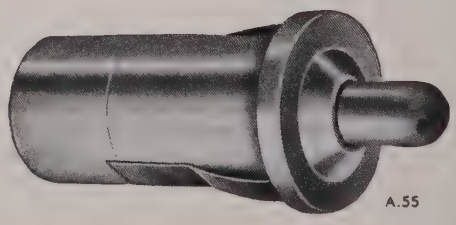
S.L.160



S.L.50



S.L.162

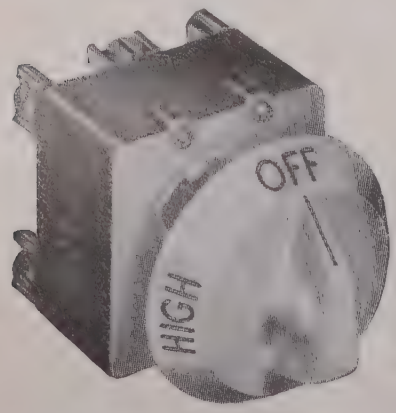


A.55

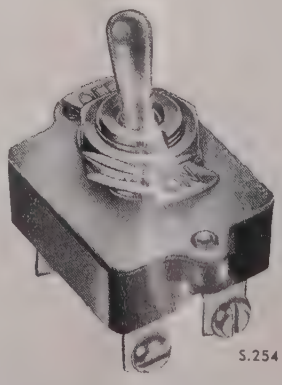
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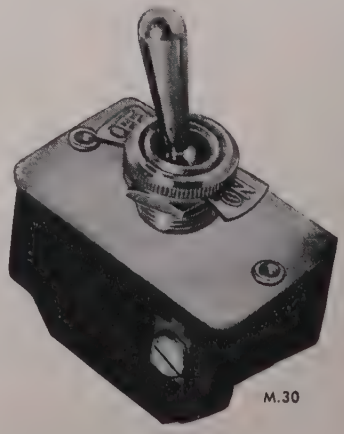
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C.S.200



S.254



M.30

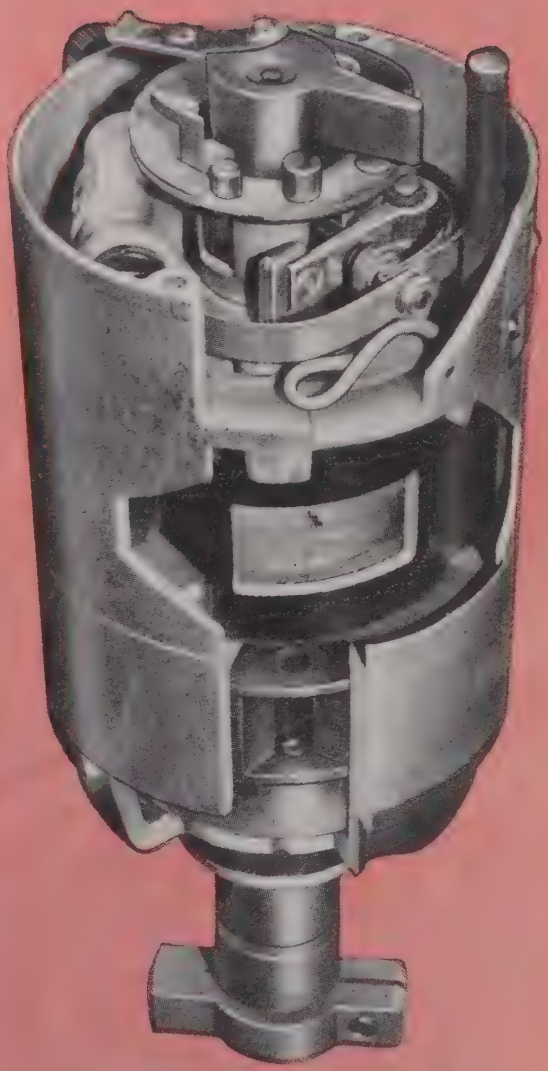
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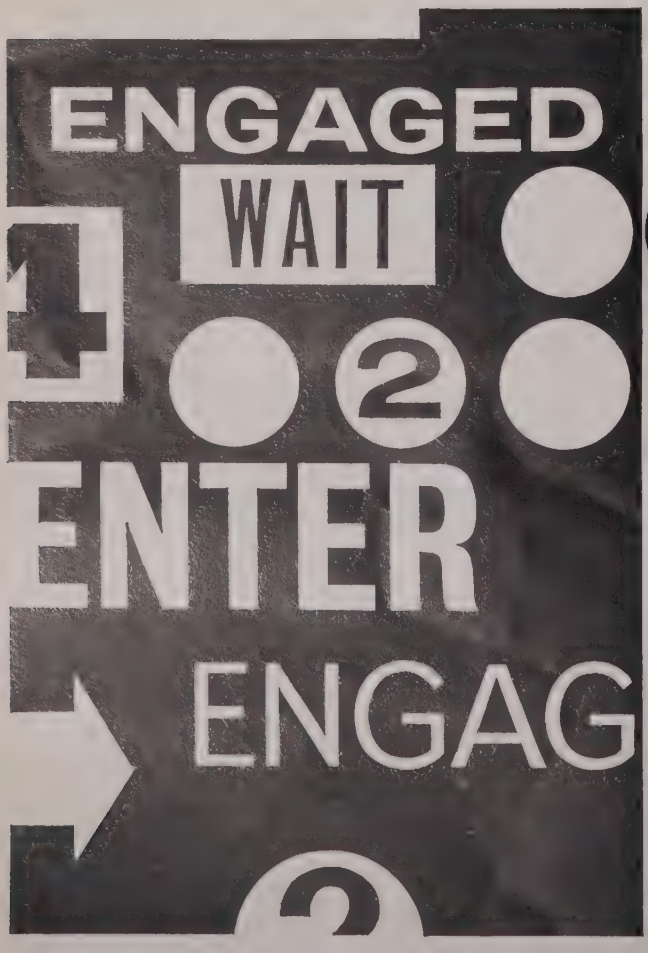
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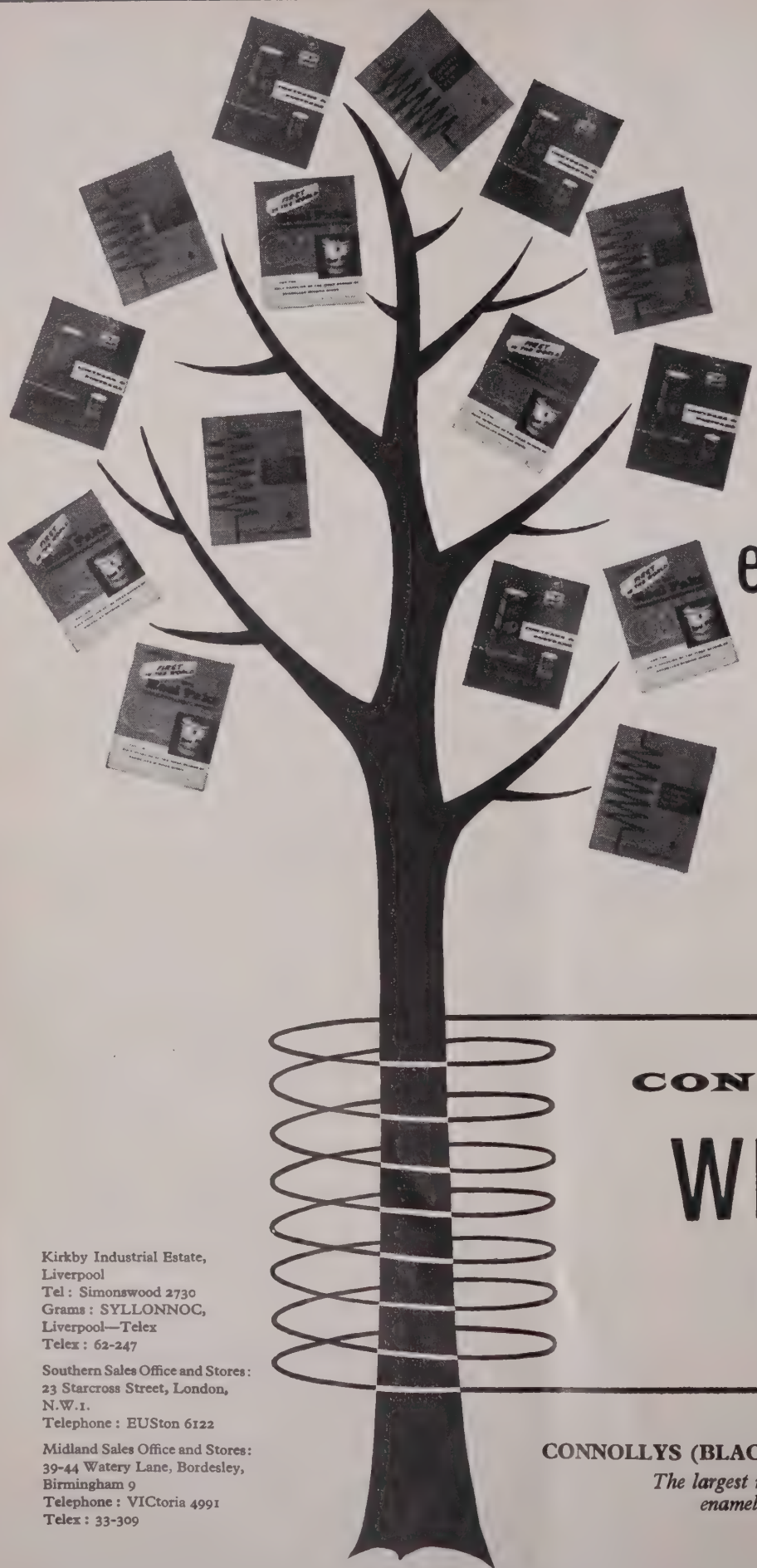
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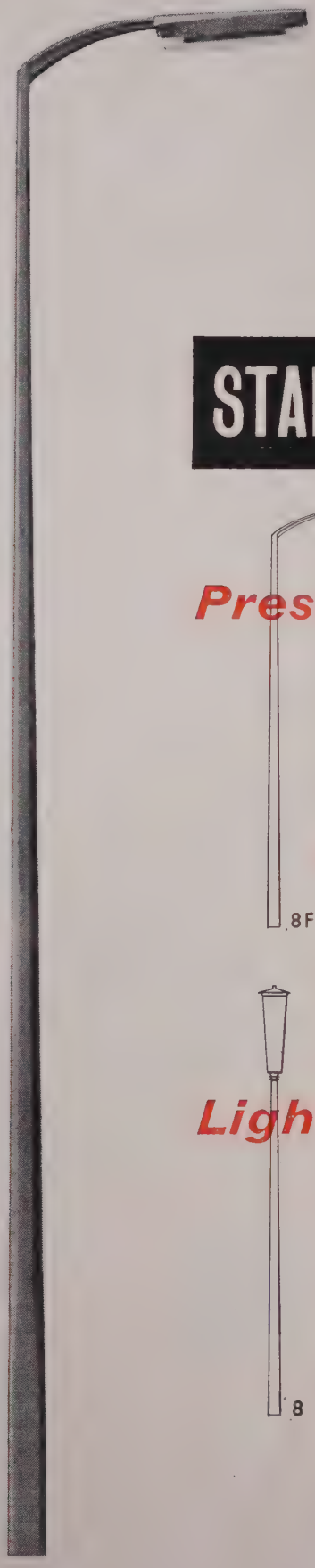
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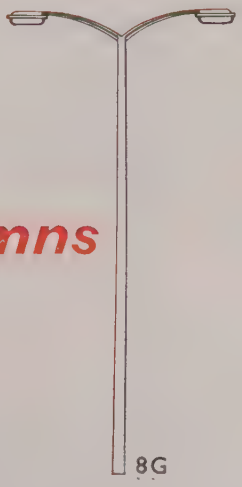
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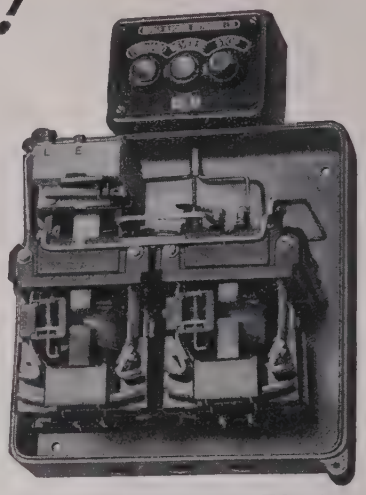
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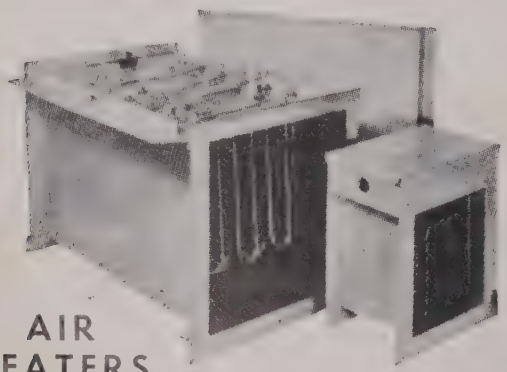
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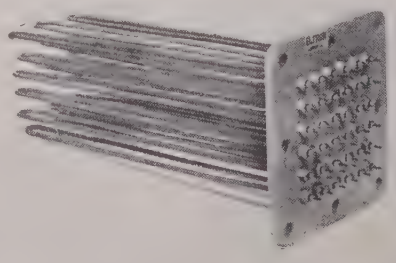
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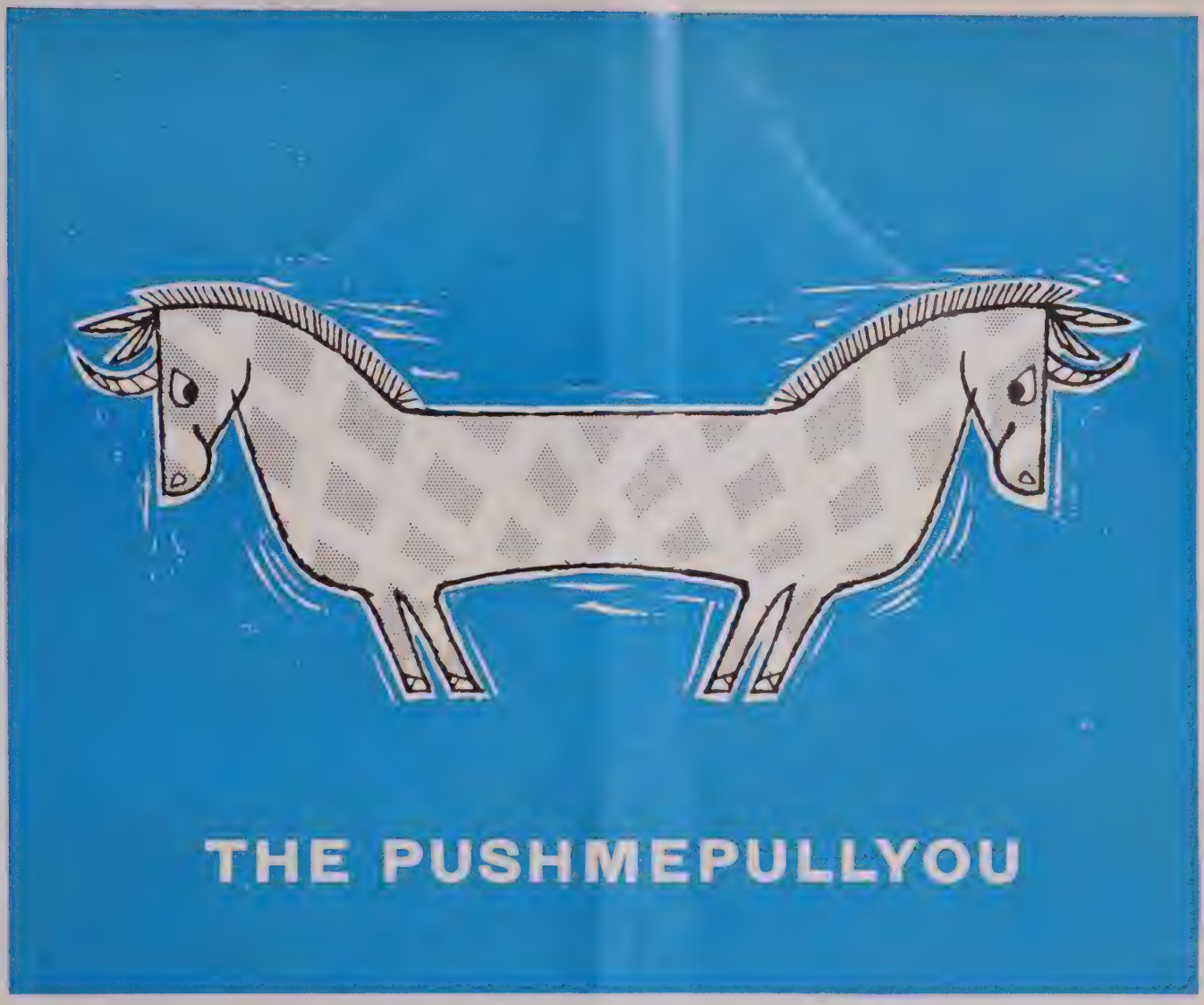


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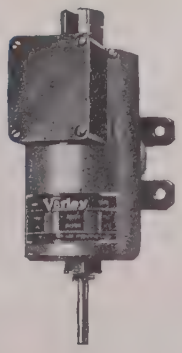
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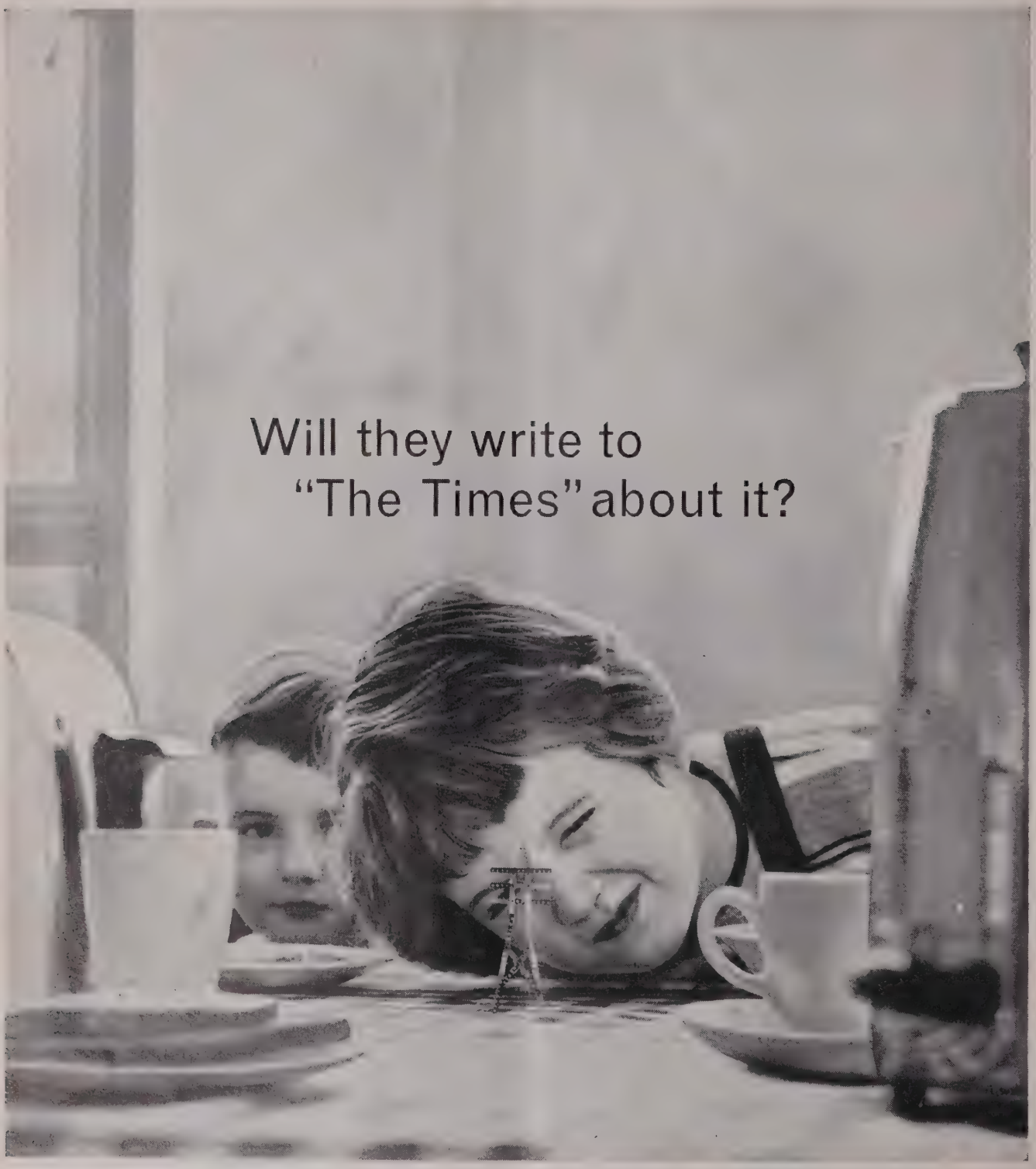
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Electrical, Heating, Air Conditioning, Ventilating and Plumbing Engineers and Contractors

ELECTRICAL INSTALLATIONS OF ALL TYPES
THE SANDON MOTOR & ENGINEERING COMPANY LIMITED
1-3 Grundy Street, Liverpool 5
Telephone: NOR. 2226 (4 lines) *Telex 62438*

YORKSHIRE

Electrical Engineers and Contractors
SOUTHERN & REDFERN LTD.
Woodhead Road, Bradford 7
Textile Maintenance, Repairs and Rewinds
Telephones: Bradford 23871—Late Phone: Bradford 65837

Est. 50 Yrs. **THE** *Telephone: 23042 (3 lines)*
HUMBER ELECTRICAL ENGINEERING CO. LTD.
Portland Place, Hull
Contracting Electrical Engineers. Motor Rewinds and Repairs
Branches at :— GRIMSBY, GOOLE, YORK, WALLSEND

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
44 Bank Street, Sheffield 1
Telephone 24015 (3 lines) *Telegrams: "Whelect"*

N. G. BAILEY & CO. LTD.
Electrical and Mechanical Contractors
10 Sharrow Lane, Sheffield 11
Telephone 53328
Also at: Leeds, Ilkley, London, Manchester, Cardiff, Bristol and Scunthorpe

MARSH BROS. (ELECTRIC) LTD.
Clough Bank, Sheffield 2
Telephone 22384-5. *Telegrams: Marbros. Sheffield.* *Established 1901*
ELECTRICAL INSTALLATION CONTRACTORS
Approved Hoover Dealers, all Products, including Fractional Horse-Power Motors and spare parts

Power, Heating and Lighting Installations. Factory Maintenance.
Mechanical and Electrical Engineers. Break-down Specialists
ROTARY ELECTRICAL CO. LTD.
Gilpin Street, Sheffield 6
Telephone: 29277/8

Electrical Contractors
CABLE JOINTING & ERECTION CO.
69 Dame Agnes Street, Nottingham
Telephone: Nottingham 84887
Cable Jointing. Cable Laying. Keenest Prices.

HOLLIDAY (ELECTRICAL) LTD.
Delta House, 222 Balham High Road
London, S.W.12
ELECTRICAL ENGINEERS AND CONTRACTORS

NORTH WESTERN

Electrical Engineers and Contractors.
JOHN RUSHTON & SON
161 Great Moor Street, Bolton
Telephone: 22184
Industrial and Domestic Installations. Maintenance and Repairs.

ANGLO-AMERICAN ELECTRICAL COMPANY
Olive St., Bury, Lancs.
Telephone: Bolton 27251
Electrical Installations: Power, Heating, Lighting.
Manufacturers of Fluorescent Fittings, Ballast Units, etc.

DRAKE & GORHAM (Contractors) LTD.
21 Newton Street, Piccadilly, Manchester 1
Telephone: Manchester Central 4701
Electrical Engineers and Contractors

. . . for all electrical installations
F. H. WHEELER & CO. LTD.
Regal Buildings, Oxford Road, Manchester 1
Telephone: Central 8207-8

Industrial Installations
W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.

Contracting	Manufacturing	Electronic Maintenance
12 York Street, Manchester 2	Shepley Estate, Audenshaw	Grosvenor Street, Manchester
CENtral 2991-3	*DENton 3961*	*ARDwick 5011*

W. J. FURSE & CO. (MANCHESTER) LTD.
20 Mount Street, Manchester 2
Telephone: Blackfriars 5014-5-6
For Electrical Installations and Contract Work

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.
Bermuda House, 4/6 Hall Street, Manchester 2
Telephone: Manchester Central 3571
Britain's largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

NORTH EASTERN

COX-WALKERS LTD.
North Eastern Electric Works, Feethams, Darlington
Electrical Contractors of repute since 1880. Motor Rewinds and Manufacturing Engineers
Telephone: 66277/8

Engineers and Contractors
CITY ELECTRICAL CO.
Turks Head Yard, Cecil Street, Lincoln
Telephone: Lincoln 124 *London: HOLborn 9722*

NORTH OF ENGLAND ENGINEERING & ELECTRICAL CO. LTD.

Ferryhill	Victoria Bldgs.	Palladium Buildings
Co. Durham	Long Row, Sunderland	Middlesbrough
Tel: 435/6	*Tel: 58762*	*Tel: 88156*

ELECTRICAL INSTALLATION CONTRACTORS

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD.
Argyle House, Argyle Street, Newcastle-upon-Tyne 1
Telephone 28605
Britain's Largest Electrical Installation Organisation for all high-class Electrical Installations and Instrumentations

. . for all electrical installations
F. H. WHEELER & CO. LTD.
52 Elswick Road, Newcastle
Telephone: Newcastle 36271

SOUTH WEST SCOTLAND

JAMES SCOTT & CO. (ELECTRICAL ENGINEERS) LTD

80/110 Finnieston Street	21/25 George IV Bridge
Glasgow, C.3	Edinburgh
Telephone: Central 3866	*Telephone: Central 6424*

Britain's Largest Electrical Installation Organisation for all high-class Electrical Installation and Instrumentation

(Continued on page 86)

(*Continued from page 85*)

REPUBLIC OF IRELAND

Electrical Engineering Contractors
A. G. BRUTY LIMITED
38 Dawson Street, Dublin
Telephone: Dublin 73181

Applications for particulars of costs and standard style of advertisements in this Regional Guide should be addressed to:

THE ADVERTISEMENT DEPARTMENT
ELECTRICAL REVIEW
DORSET HOUSE, STAMFORD STREET
LONDON, S.E.1

Representative Organization wishes to *represent* for Italy

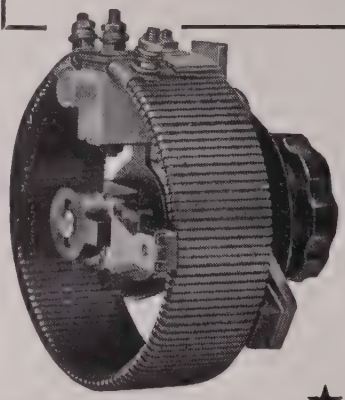
IMPORTANT MANUFACTURERS OF GENERAL ELECTRICAL MATERIAL
for industrial use

References at disposal.

Please write with full details to:
Ditta Mario Lazzaroni,
Rapp. Materiale Elettrico,
Via San Gregorio 17, Milano (Italy)

a range of extremely robust

ROTARY RHEOSTATS



Open or enclosed types
100 watts
150 watts
200 watts
Larger sizes quoted on request

An extremely robust rheostat with a unique metal cored former (patent appd. for)

Full details from the manufacturers

The **CURTIS** *Manufacturing Company Limited*
26-28 PADDENSWICK ROAD
HAMMERSMITH, W.6
Telephone: RIV. 4456 and 4583

Whatever the project . . .

. . . light it up with



D. R. ILLUMINATIONS LTD.
WARREN STREET - STOCKPORT - CHESHIRE
Telephone: STOckport 7159

Contractors:
SIR ROBERT McALPINE & SONS LTD.
Building:
SHELL CENTRE — SOUTH BANK.
Architects:
Messrs. EASTON & ROBERTSON CUSDIN, PRESTON AND SMITH

A MEMBER OF THE AERIALITE GROUP

CW7201

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 4/- per line (approx. 6 words).
DISPLAYED CLASSIFIED:—53/- per single column inch.
Where an advertisement includes a Box Number there is an additional charge of 1/-.
SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.
Remittances payable to "ELECTRICAL REVIEW."
SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES TO BOX NUMBERS should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. If an applicant for a situation appearing under a Box Number does not wish his reply to be forwarded to a particular firm or individual, instructions to this effect should be addressed to the Advertisement Supervisor, ELECTRICAL REVIEW. The name of an advertiser using a Box Number cannot be disclosed.

Advertisements are accepted up to **first post on Monday** of the week of issue

If blocks, bold type or ruled borders are required then on **Friday** prior to week of issue

All communications to be addressed to:
Classified Advertisement Department,
ELECTRICAL REVIEW
Dorset House, Stamford Street
London, S.E.1

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

DURHAM COUNTY COUNCIL

Road A.177: Roundabout near New County Hall, Aykley Heads, Durham

Overhead Lighting

FIXED PRICE TENDERS are invited for the supply, erection and putting into service of a total of 20 Overhead Lighting Units on and adjacent to the above roundabout.

The lanterns are to be 400-watt colour-corrected mercury vapour type, eleven with cut-off distribution and nine non-cut-off, mounted at a height of 25 feet on steel columns.

Forms and conditions of tender, conditions of contract, specifications and schedules obtainable from the County Surveyor, Aykley Heads, Durham. Tenders in plain sealed envelopes endorsed "Tender for Overhead Lighting" to be delivered to the undersigned not later than noon on Monday, 16th October, 1961.

The Council do not bind themselves to accept the lowest or any tender.

J. T. BROCKBANK,
Clerk of the County Council.

2442

URBAN DISTRICT COUNCIL OF ABERDARE

Street Lighting

TENDERS are invited for the supply and installation of 13 Columns with Lanterns at the new Housing Estate at Maesgwyn, Cwmdare.

Tender documents may be obtained from the Engineer and Surveyor, Vestry Hall, Aberdare, on receipt of a deposit of 2 guineas, which will be returned on receipt of a bona fide tender and all loaned documents.

Tenders, in plain sealed envelopes bearing no mark or indication of the sender but endorsed "Lighting, Maesgwyn," must reach me on or before 20th October, 1961.

D. G. JAMES,
Clerk of the Council.

Town Hall, Aberdare.
19th September, 1961.

2414

BOROUGH OF SCUNTHORPE

Electrical Rewiring to Modern Standards of 226 Pre-War Council Houses, Crosby Estate

TENDERS are invited in respect of the above from Electrical Contractors who are enrolled with the National Inspection Council for Electrical Installation Contracting.

Forms of tender and specification may be obtained from the Housing Manager, Housing Department, Lincoln Gardens, Scunthorpe.

Sealed tenders must be received by the Town Clerk, Municipal Offices, 34, High Street, Scunthorpe, in the envelope provided, not later than noon on the 20th October, 1961.

The Corporation do not bind themselves to accept the lowest or any tender.

2420

CITY OF BELFAST

TENDERS are invited for the supply, delivery and erection of

33/11-kV, 7,500-kVA
STEP-DOWN TRANSFORMERS.

Form of tender and specification No. W.200, in duplicate, may be obtained at the Electricity Department, East Briggs Street, Belfast, 1, on payment of a deposit of two guineas, which amount will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the tender documents may be obtained at one guinea each, which sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender (one copy only), in sealed envelope marked "Tender for 33/11-kV, 7,500-kVA Step-Down Transformers, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, 27th October, 1961.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast, 1.
P.O. Box 234.

2448

SITUATIONS VACANT

(See "Replies to Box Numbers" above)

COVENTRY CORPORATION

HEATING AND VENTILATING ENGINEER, Grade A.P.T. V, £1,310-£1,480, for Mechanical Engineering Services Division of the City Engineer's Department. The person appointed will be responsible for the carrying out of regular, systematic inspection of heating installations in Corporation buildings and the maintenance and improvement as needed. He will also be required to ensure the efficient performance of installations and to organise instruction for plant attendants to this end.

Applicants should be suitably qualified Heating and Ventilating Engineers with experience in the maintenance of boiler house plants.

MECHANICAL INSPECTORS, Grade A.P.T. II or III, £815-£960 or £960-£1,140, for Mechanical Engineering Services Division of City Engineer's Department.

Applicants should be holders of the Diploma of Heating and Ventilating Engineers or be otherwise suitably qualified and will be required to assist the H. and V. Engineer in the inspection, repair, maintenance and improvement of heating installations and the instruction of plant attendants.

Housing accommodation may be available. Removal expenses loan (up to £50) provided where necessary.

Application forms from CITY ENGINEER, Council House, Coventry, returnable by 16th October, 1961.

2443

MIDLANDS ELECTRICITY BOARD

SENIOR SALES REPRESENTATIVE (Agricultural) required in the Ludlow District of the Shropshire and Herefordshire Area.

Candidates should have had extensive experience of rural development and sales, and be fully conversant with all domestic uses. Must have a sound knowledge of and be able to advise upon the use of electricity in farming and horticulture, be able to discuss intelligently relevant farming matters and practice, and be prepared to give talks to the local agricultural and horticultural associations.

The possession of a driving licence is essential and the ability to estimate for installation work and the possession of technical qualifications would be an advantage.

Salary £780/£880 per annum (N.J.C. Grade 3). Superannuable.

Apply by letter within 14 days, stating age, experience, present position and salary, to Mr. W. Winwood, Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

F. W. CATER,
Secretary.

2433

EAST MIDLANDS ELECTRICITY BOARD

Northamptonshire Sub-Area

APPLICATIONS are invited from suitably qualified and experienced persons for the following appointment. Applicants should state age, qualifications, experience, etc., and quote the vacancy number.

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER, KETTERING DISTRICT
(Market Harborough)
(Vacancy No. 113/61).

Salary N.J.B. Class G, Grade 8, £1,040 to £1,165 per annum.

The duties will include the preparation of specifications and estimates for electrical installations, the supervision of electrical contracting work and advice to consumers on tariffs, electrical installations and apparatus at the Market Harborough branch of the Kettering District.

The successful applicant will be required to reside in or near Market Harborough.

Applications should be forwarded to the Manager, Northamptonshire Sub-Area, 25, Bridge Street, Northampton, by the 13th October, 1961.

2452

Situations Vacant (continued)

YORKSHIRE ELECTRICITY BOARD

Head Office

THIRD ASSISTANT ENGINEER, Distribution Design (Substations).

Duties will include the design of indoor and outdoor substations operating at voltages of 33 kV and above, the preparation of specifications for substation plant and subsequent negotiations with plant manufacturers. They will also cover protective gear applications on the primary H.V. system.

Applications are invited from engineers having a sound general knowledge of substation plant and some experience of field construction.

Salary N.J.B. Class K, Grade 8 (transitional to Scale 11), within the range £1,145 to £1,410 per annum. The commencing salary will be dependent upon qualifications and experience.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, not later than 13th October, 1961.

No. 5 (Wakefield) Sub-Area

BARNSLEY DISTRICT

INSTALLATION ENGINEER.

Applicants must have a sound technical education and practical experience in electrical contracting work of all types. They must be capable of preparing and supervising schemes for all classes of domestic, commercial and industrial installations, including specifications, estimates and tenders. Applicants must have had considerable experience in the control of workmen.

Salary N.J.B. Class J, Grade 8 (Scale 10), £1,190/£1,325 per annum.

FOURTH ASSISTANT DISTRICT ENGINEER.

Applicants should have had experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution systems. Candidates must be prepared to reside in the district and undertake standby duties.

Salary N.J.B. Class J, Grade 11 (Scale 7), £965/£1,090 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 13th October, 1961.

No. 2 (Huddersfield) Sub-Area

HALIFAX DISTRICT

FOURTH ASSISTANT DISTRICT ENGINEER (Two Posts).

Applicants should have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and ancillary equipment.

Salary N.J.B. Class J, Grade 11 (Scale 7), £965/£1,090 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, not later than 13th October, 1961.

No. 7 (Grimsby) Sub-Area

SCUNTHORPE DISTRICT

DEMONSTRATOR (Female).

Applicants must have had experience in the demonstration of electrical appliances and be capable of advising consumers on any matter relating to the use of electricity in the home.

They must have had experience in cooking practice and general showroom duties. Preference will be given to applicants holding the certificate of a recognised domestic training college, Housecraft Advisers' Diploma, Certificate of the Electrical Association for Women, or equivalent qualification.

Salary N.J.C. Grade 1, £600/£25/£700 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than 13th October, 1961.

2453

CENTRAL ELECTRICITY GENERATING BOARD

requires

ASSISTANT ENGINEERS

FOR THE

TRANSMISSION DEPARTMENT

at Headquarters, London, S.E.1

APPLICATIONS are invited for the following posts in the Plant Design Section :—

A. ASSISTANT ENGINEER (Switchgear).

The successful applicant will be engaged mainly on the development of new designs of outdoor and indoor substations up to 400 kV, and of the related equipment. Experience is required in the layout of E.H.V. substations and in the design calculations involved. The section comprises a number of specialist engineers concerned with the main types of transmission equipment for service voltages up to 400 kV. Their duties include the preparation of general specifications and standards, promotion and evaluation of new developments and designs for general application, their type testing and approval, and the technical assessment of tenders. The application to this work of operational experience and faults is given particular emphasis.

Salaries within the range £1,280-£1,890 p.a., according to qualifications and experience.

Applicants should have a University Degree or Higher National Certificate, or equivalent qualifications leading to Corporate Membership of the I.E.E.

B. ASSISTANT TELECOMMUNICATION ENGINEER.

This post is in the Telecommunications Group and the successful applicant will be engaged mainly in the planning and preparation of contract specifications for extensions to the Grid system control equipment. The section comprises a number of specialist groups concerned with the design of the equipment of the Board's transmission system.

Applicants should have a sound training in telecommunications as applied to power systems, with qualifications of Higher National Certificate or equivalent. They must have practical experience and understanding of the Board's standardised system of telecommunication and telemetering equipment.

Salary within the range £1,280-£1,670 p.a., according to qualifications and experience.

Applications stating age, qualifications, experience, present position, salary and post applied for to the Appointments Officer, 24/30, Holborn, London, E.C.1, by 13th October. Quote ref. ER/436.

2421

ESTIMATOR

required by

ELECTRIC MOTOR MANUFACTURERS

(Near S.E. LONDON)

TO PREPARE TENDERS FOR SPECIALISED PLANT

Permanent Position. Good Prospects. Contributory Pension Scheme

Box No. 2373

CENTRAL ELECTRICITY GENERATING BOARD

Western Division

SHIFT CHARGE ENGINEER required at Castle Meads Power Station, Gloucester (Vacancy No. ER/90/61).

Superannuation scheme. Salary N.J.B. Class E, Grade 7, Scale 7, £965-£1,090 p.a., plus 10% shift allowance.

Applicants should have had considerable experience in modern power station operation and preferably be graduate or corporate members of a recognised engineering institution or possess equivalent qualifications.

Applications on form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Road, Bristol, 8, should be completed and returned by 9th October, 1961.

2451

BEDFORDSHIRE COUNTY COUNCIL

Heating and Electrical Section

APPLICATIONS are invited from appropriately qualified persons for the post of ENGINEERING ASSISTANT, A.P.T. Grade III (£960-£1,140).

Applicants must be competent draughtsmen and have a knowledge of electrical installation work.

The commencing salary within the grade will be in accordance with qualifications and experience.

Application forms obtainable from the County Architect, Shire Hall, Bedford, to be returned by 9th October, 1961.

2393

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Maintenance)

Engineering Department of No. 2 (Newbury) Sub-Area Office. Salary N.J.B. Class M, Grade 10 (£1,275-£1,410 per annum). N.J.B. conditions of service.

The duties of the post will be to assist the Sub-Area Maintenance and Operation Engineer principally with the commissioning and also with the site testing and maintenance of mains and substation plant and equipment operating at voltages up to 33 kV. A sound technical training and experience of similar work are required.

The successful candidate will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks., and returned to him, quoting Z.1407, not later than 9th October, 1961.

2450

'ENGLISH ELECTRIC'

ATOMIC POWER DIVISION · WHETSTONE · NR. LEICESTER

Senior Electrical Development Engineer

The Reactor Engineering Department invite enquiries from engineers interested in the design and development of Control and Instrumentation equipment for Nuclear Power Stations. Previous experience in the nuclear field is not essential, but experience in one of the following fields would be advantageous.

1. **Servo Mechanisms and Industrial Control Equipment.**
2. **Electro Mechanical and Solid State Switching Circuitry.**
3. **Process Plant Instrumentation.**

Technical education to G.I.E.E. or degree is essential. Applications, which will be treated in strict confidence, should be addressed to The Chief Engineer, Dept. G.P.S., English Electric House, Strand, London, W.C.2, quoting reference number ER1895Q.

2431

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments which are subject to the conditions of the National Joint Board.

Area Board Headquarters

(a) SENIOR ASSISTANT ENGINEER, Chief Engineer's Department, Planning and Development Section, with location at Carliol House, Newcastle upon Tyne. Applicants should be Corporate Members of the Institution of Electrical Engineers anad should have had wide experience in the planning and design of high-voltage distribution systems operating at voltages up to and including 66 kV. Applicants must also be conversant with modern methods adopted in the planning and design of low and medium-voltage distribution networks.

Salary Class K, Grade 1, £1,880/£2,235 per annum.

(b) SENIOR ASSISTANT ENGINEER (Protection), Chief Engineer's Department, Technical Section, with location at Carliol House, Newcastle upon Tyne. Applicants must be fully conversant with the protective methods employed in the large-scale distribution of electricity and should have experience in the design, specification, installation and application of protective equipment in general. Corporate Membership of the I.E.E. will be an advantage.

Salary Class K, Grade 1, £1,880/£2,235 per annum.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, 1, within fourteen days of the appearance of this advertisement.

2449

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

WEST INDIAN Engineers who are interested in careers with the Trinidad and Tobago Electricity Commission are invited to write to the Secretary and Personnel Manager, P.O. Box 121, Port-of-Spain, Trinidad, West Indies.

There are good opportunities for young West Indian nationals with degrees in Electrical or Mechanical Engineering or who are Graduate Members of the Institution of Electrical Engineers.

Commencing salary £1,050 per annum.

Experience not necessary, but candidates MUST be qualified.

2345

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER is required at Hams Hall "A" Power Station, Lea Marston, Sutton Coldfield. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade K.8, £1,275-£1,410 per annum, plus 10% for shift duties.

Applicants should have received a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear, and a knowledge of P.F. firing is desirable. Appropriate technical qualifications would be an advantage.

Apply, quoting Vacancy No. 252/61 MD, on form AE6, available from the Station Superintendent, Hams Hall Power Station, Lea Marston, Sutton Coldfield, Warwickshire, by 9th October, 1961.

2457

ELECTRICAL ENGINEERS AND DRAUGHTSMEN

required for several companies in London. Permanent positions with good salaries. No fees to staff. Come and discuss your future post with us—we specialise in technical appointments.

BUSINESS VACANCIES BUREAU LTD.
32, Victoria Street, London, S.W.1
Telephone: ABB. 7200

2459

LONDON ELECTRICITY BOARD

Assistant Distribution Engineer

APPLICATIONS are invited for the above position in the Board's South Eastern District, at 44, Powis Street, Woolwich, London, S.E.18.

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience in all branches of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class H, Grade 11, £940 per annum rising to £1,065 per annum, inclusive of London allowance.

Applications stating age, qualifications and experience should be sent to the District Manager at the above address within fourteen days of the publication date of this notice. Please quote ref. PER/V/3398/R.

2455

AIR MINISTRY WORKS DEPARTMENT

invites applications for positions as STATION ENGINEERS Grade III at R.A.F. and Ministry of Aviation establishments throughout the United Kingdom to supervise the installation, operation and maintenance of electrical and/or mechanical plant.

SALARY, which is dependent upon age, quals. and exp., ranges in the U.K. from £801 (National rate) at age 25 to £988 max. in Grade III.

QUALS. and EXP. Applicants, who must be natural-born British subjects up to age 35, should have served an apprenticeship and should hold an O.N.C. or C. & G. Technical Cert. or 2nd Class M. of T. Cert. or equiv. Experience is required in one or more of the following :—

Electrical generation.
Electrical distribution, H.T. and L.T.
Electrical installations, industrial & domestic.
Light current and/or electronic engineering.
Ventilation and air conditioning.
Heating and hot water supply.
Compressed gases and refrigeration.
Bulk fuel installation.
Diesel engine-driven plant.

Internal training courses provided and financial assistance and time off may be allowed for recognised courses of study leading to higher qualifications.

PROSPECTS. Appointments are non-pensionable but retirement/resignation gratuity payable after 5 years' or more service. Excellent opportunities of obtaining permanent pensionable posts (with all service counting) and of advancement to the higher grades in which posts number 480 approx.

Higher grade salaries vary between £988 and £1,747 p.a. (National rate) and vacancies are, as a rule, filled by promotion of serving staff. Opportunities for overseas tours for which special allowances ranging at present up to £1,800 p.a. are payable in addition to a higher salary. 5-day week with 26½ days' paid leave a year initially including public holidays.

Forms from Manager (PE.1), Ministry of Labour, Professional and Executive Register, Atlantic House, Farringdon Street, London, E.C.4. Candidates selected will normally be interviewed in London and certain expenses reimbursed. Only applicants selected for interview will be advised.

269

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Re-Advertisement

APPLICATIONS are invited for the superannuable N.J.B. appointment of ASSISTANT ENGINEER (Co-ordinating) at Uskmouth "B" Power Station, West Nash, near Newport, Mon.

Salary Schedule A, Class K, Grade 10, Scale 9, £1,115-£1,245 per annum.

Applicants should possess a Higher National Certicate in either Mechanical or Electrical Engineering, and should be capable of organising job training for power station employees. Previous experience or training in the electricity supply industry desirable.

The successful candidate will conduct special investigations, organise Civil Defence and fire fighting services, and carry out other general duties as required by the Station Superintendent.

Previous applicants need not re-apply.

Special application forms obtainable from Divisional Secretary, Central Electricity Generating Board, South Wales Division, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 14th October, 1961.

2460

Situations Vacant (continued)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER, Crawley and Horsham District.

Salary within the range £965-£1,090 under N.J.B. Class F, Grade 8. Applicants should be suitably qualified and have had training and experience in the construction, operation and maintenance of underground and overhead distribution systems up to 11 kV. The successful applicant will be required to reside within the District and undertake standby duties. Subject to certain conditions, housing accommodation will be available in Crawley.

Applications, quoting ER and naming two referees, to District Manager, SEEBOARD, 50-52, The Broadway, Crawley, Sussex, by 11th October, 1961.

ASSISTANT DISTRICT ENGINEER, Guildford District.

Salary £1,040-£1,165 under N.J.B. Class F, Grade 7. Superannuable. Preference given to applicants with technical qualifications up to H.N.C. standard and with practical experience of the planning, construction, operation and maintenance of MV and 11-kV underground and overhead systems. Consideration will be given to a private car allowance and assistance in house purchasing in appropriate circumstances. The successful applicant will be required to undertake standby duties.

Applications, quoting ER, on forms from District Manager, SEEBOARD, Woodbridge Road, Guildford, Surrey, by 11th October, 1961.

CHARGEHAND LINESMAN (over 30 kV), East Sussex and South West Kent Sub-Area.

Wages 5s. 10¾d. per hour for 42-hour 5-day week under N.J.I.C. Agreement. Duties involve erection and maintenance of overhead lines up to 33 kV in all parts of the Sub-Area, operating from the Eastbourne depot. Superannuation optional after two years' service.

Applications, quoting ER, and naming two referees, to the East Sussex and South West Kent Manager, SEEBOARD, Westlords, Willingdon Road, Eastbourne, by 9th October, 1961.

GEORGE WRAY, Secretary.

2454

OVERSEAS

ELECTRICAL CONTRACTOR

requires BRANCH MANAGER for West Africa with contracting experience from enquiry to final account, and experience of controlling branch with turnover of £½ million.

Excellent conditions and prospects offered.

Applications in writing giving fullest details of past experience to—Box 2410.

HEREFORDSHIRE COUNTY COUNCIL

ASSISTANT ELECTRICAL ENGINEER required for interesting duties in connection with large and small contracts for installations in schools and other public buildings. Local government experience not essential.

A.P.T. Grade I (£645 to £815 per annum). Starting salary according to ability and experience. Car allowance. Help with removal expenses. Separation allowance. Five-day week. Pensionable post.

Hereford is an expanding city situated in the beautiful Wye valley.

Application forms from County Architect, Bath Street, Hereford, to be submitted by 16th October, 1961.

For further information write or ring Chief Engineer (Arthur Godridge), Tel. No. Hereford 6401.

2427

E.A.P.L.

HAVE THE UNDERNOTED VACANCIES IN

KENYA COLONY

(a) MAINS ENGINEERS. Applicants (age 28-40 years) should be at least Graduate I.E.E. standard. Fully conversant with construction, maintenance and operation of distribution networks, including surveying, profiling and estimating. Experience in street lighting erection and house wiring problems an advantage. Ability to control staff essential.

(b) ELECTRICAL TECHNICIAN. Applicants (age 28-35 years) should possess equivalent of City and Guilds Electrical Technicians' Certificate and have a sound knowledge of the erection and maintenance of heavy electrical plant, including rotating electrical machinery, transformers, switchgear protection, control circuits and associated equipment.

(c) CONTROL ENGINEER. Applicants should be at least 28 years of age and possess an O.N.C. (Elect. Eng.) or equivalent. Experienced on H.T. Mains work, control centre and power station operation. They must be familiar with the construction of different types of switchgear and ancillary equipment including protection systems.

The vacancies offer progressive permanent positions in the following salary scale:—

MAINS ENGINEERS	£1,335 × £42 to £1,545 per annum
ELECTRICAL TECHNICIAN	£1,209 × £42 to £1,419 per annum
CONTROL ENGINEER	£1,335 × £42 to £1,545—EB £1,587 × £42 to £1,797 per annum

Four-year tours—six months' paid home leave · Free furnished housing · Contributory Pension Scheme · Generous Family Medical Scheme · Children's Education Allowance · Free Life Assurance and Widows' Pension Fund.

Write details age, qualifications, experience, present post and salary to:—

THE LONDON SECRETARY
EAST AFRICAN POWER AND LIGHTING CO. LTD.
BOW BELLS HOUSE, BREAD STREET, LONDON, E.C.4

2342

CAMBRIDGESHIRE EDUCATION COMMITTEE

Cambridgeshire College of Arts and Technology
(Principal: D. E. Mumford, M.A.)

LECTURER or ASSISTANT LECTURER GRADE B in ELECTROTECHNOLOGY required as soon as possible, but not later than 1st January, 1962. The minimum qualifications for the Grade B post are an H.N.C. in Electrical Engineering and appropriate industrial experience.

The appointment to one post or the other will depend upon academic qualifications, together with the industrial and teaching experience (if any) of the successful applicant.

Present salary scales: Lecturer £1,370 × £35 to £1,550; Assistant Lecturer Grade B £700 × £27 10s. to £1,150, with additions for training, degree (£90) and good Honours Degree (£75). Starting point on either scale depends upon previous experience.

Further particulars and application forms, to be returned as soon as possible, from the Principal, Cambridgeshire College of Arts and Technology, Collier Road, Cambridge.

2462

KAMPALA MUNICIPAL COUNCIL, UGANDA, EAST AFRICA

WORKS SUPERVISOR (Electrical) required in scale £1,143-£1,671, plus 6% gratuity on completion of contract of 21/27 months; 4 months' paid leave and air passages for officer and family after two years; provident fund (adds 7½% to salary); housing at nominal rent; medical and dental benefits; car loan and allowances; good climate and conditions.

Applicants must have served a 5-year apprenticeship with a recognised electrical undertaking or company and hold the Ordinary National Certificate (Electrical) or equivalent qualification. Works training and experience in maintenance and repair of S.G.E. and/or A.T.E. vehicular-actuated traffic signals essential.

The duties are principally on the installation and maintenance of the vehicular-actuated traffic signals; also on the installation, maintenance and repair of the normal electrical systems and plant of a local authority.

Apply, giving age and 2 referees, to the Town Clerk, P.O. Box 210, Kampala, Uganda, by 21st October, 1961. Canvassing disqualifies.

2439

MINISTRY OF AVIATION

ENGINEER II required in Technical Facilities Department, Royal Aircraft Establishment, Farnborough, Hants. Responsible to Senior Engineer for supervision of a works services section dealing with electrical and mechanical services. Section covers electricity supply, distribution and utilisation up to 33 kV A.C. and 525 volts D.C., with input capacity in excess of 50,000 kVA. Also responsible for generation and distribution of steam supplies for heating, C.A. and water services, and modifications as necessary for the experimental work of the Establishment.

Quals. and Exp.: Should have served recognised engineering apprenticeship, attained Corporate Membership of the Institution of Electrical or Mechanical Engineers or possess equiv. quals. Experience should include management of personnel, and have a comprehensive knowledge of the technology of electrical supply, etc., and maintenance and safety aspects of the work.

Salary £1,416-£1,900 (Provincial). National rates from 1.1.62 (£1,456 - £1,950). Opportunities to compete for established pensionable posts.

Forms from Ministry of Labour, Technical and Scientific Register (K), 28, King Street, London, S.W.1, quoting D.474/1A.

2418

To expand an active development team

BRYCE

require a

DEVELOPMENT ENGINEER

to work on interesting projects concerned with the manufacture of power transformers and capacitors.

Applications are invited from qualified engineers who have experience in either transformer or capacitor manufacture. Minimum standard required: Graduate Membership I.E.E.

Reply to:—

The Technical Director
BRYCE ELECTRIC CONSTRUCTION CO. LTD.
Kelvin Works, Hackbridge, Surrey

2383

COVENTRY CORPORATION

APPLICATIONS are invited for the appointment of DIVISIONAL HEAD OF THE MECHANICAL ENGINEERING SERVICES DIVISION of the City Engineer's Department within salary scale E (£1,860-£2,120 p.a.).

This appointment is a new one and arises from the formation of the Division by grouping together the present sections of the Department working in the electrical, mechanical and heating and ventilating engineering fields. The sections of the Division include:—

(a) Electrical, Mechanical and Heating and Ventilating Engineering Design Office, which is a large office providing a consulting engineering service on large-scale development projects and a major public building programme.
(b) Street and Public Lighting Section.
(c) Electrical Direct Works Section, which carries out the repair and maintenance on existing installations and also new works on Corporation buildings and projects.
(d) Heating and Ventilating Direct Works Section, which carries out the repair, maintenance and improvement of installations in all Corporation buildings.
(e) Mechanical Engineering Workshops, which are responsible for the servicing, maintenance and repair of the departmental fleet of vehicles and transport and of mobile and static mechanical plant.

Candidates for this appointment, which is one of wide scope and responsibility, should be suitably qualified and experienced to direct and control the work of the Division. They should be Chartered Electrical and/or Mechanical Engineers with extensive design and installation experience and should also have qualifications and experience in the other fields of engineering in which the Division operates. Applicants must also have proven ability in the administration of a professional department and the control of a large labour force. Housing accommodation may be available. Removal expenses loan (up to £50) provided where necessary.

Application forms from CITY ENGINEER, Council House, Coventry, returnable by 16th October, 1961.

2444

LONDON ELECTRICITY BOARD

General Assistant Engineers

APPLICATIONS are invited for the above position. Initially the successful candidates will be located at 84, Romford Road, Stratford, London, E.15.

Applicants should have had a sound technical education to the standard of the Higher National Certificate, and have completed a recognised period of training in the electricity industry, or have equivalent experience.

The posts are graded under Schedule A of the National Joint Board Agreement, Class K (Area) as Grade 15, £725 to £920 per annum, inclusive of London allowance.

Applications, stating age, qualifications and experience should be sent direct to the Manager at the above address within 14 days of the publication date of this notice. Please quote ref. PER/V/3110/R.

2415

DORMAN & SMITH LIMITED

require ELECTRICAL DESIGN ENGINEERS with experience of low and medium-voltage electrical distribution practice. Successful applicants will be of approximately H.N.C. standard and have worked for some time on the design of electromechanical devices.

Remuneration will be considerably in excess of A.E.S.D. rates.

Apply to :—

The Secretary
Dorman & Smith Limited
Atherton Works, Preston, Lancs.

2467

RHODESIA CONGO BORDER POWER CORPORATION LIMITED

Kitwe, Northern Rhodesia

Technical Engineers

APPLICATIONS are invited from qualified Electrical Engineers (Degree or Corporate Membership) for the position of TECHNICAL ENGINEER on the Corporation's Engineering Staff at Kitwe, Northern Rhodesia, the operational centre of its 220-kV and 66-kV networks.

Applicants should be preferably in the age group 28/38, having had at least five years' experience in the electricity supply industry or in the manufacture of apparatus related to the supply industry.

The duties will include:—

1. Calculations related to system load studies, protective gear settings, maximum short circuit evaluations, including the use of a D.C. analyser board. Experience in tariff computations would be an advantage.

2. Supervision of the Protection Department, which is responsible for the installation, commissioning and maintenance of modern forms of protective gear and including carrier frequency electronic telemetering, remote control and communicating apparatus.

The design of the equipment is at present the responsibility of the Corporation's Consulting Engineers, with whom the Technical Engineer would be required to maintain close liaison.

The commencing basic salary will be in the region of £1,800-£2,000 (Rhodesian currency) per annum, dependent on experience. The successful applicant will participate in the Corporation's bonus scheme. The rate of bonus is related to the prosperity of the copper mining industry. The present rate is 36½% of basic salary. Housing (including basic heavy furniture) will be provided at a sub-economic rental.

Medical specialist fund, pension and life assurance schemes are provided. In the case of the latter the employee contributes a minimum of 5% basic salary and the Corporation a further 5%, plus ½% for each completed year of service.

Paid leave will be at the rate of 51 days per annum, and may be accumulated to a maximum of three years' entitlement.

The Corporation is responsible for all electricity supplies to the copper mining industry in Northern Rhodesia. The system load is at present 260 MW, 1,800 million kWh per year.

All applications, giving full details of experience, marital status, etc., should reach:—

The Secretary,
Rhodesia Congo Border Power Corporation Limited,
P.O. Box 819,
Kitwe, Northern Rhodesia,

not later than 15th October, 1961.

2363

METROPOLITAN BOROUGH OF LEWISHAM

Public Lighting Assistant

SALARY scale £1,005-£1,185 p.a. (A.P.T. III, plus London weighting max.). Duties include supervision and maintenance of street lighting, beacons and bollards, etc.

Further particulars and form of application from Town Clerk (Dpe. ER), Lewisham Town Hall, Catford, London, S.E.6. Closing date 16th October, 1961. 2458

SOUTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER, EXETER.

Salary within Class G, Grade 9, Salary Scale 7 (£965-£1,090 per annum) of the N.J.B. Agreement.

The successful candidate will be required to assist generally in planning, operation, maintenance and construction work within the District. He will be employed initially on the planning of schemes up to 11 kV, and also be expected to undertake standby duty.

Sound training in the distribution side of the supply industry and experience in operating systems up to 11 kV is essential. Applicants should be competent to supervise labour. Possession of the Higher National Certificate in Electrical Engineering is desirable and possession of a current driving licence will be an advantage.

Applications for this post to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, 3, Bedford Street, Exeter. Closing date for receipt of completed applications is 14th October, 1961.

FOURTH ASSISTANT DISTRICT ENGINEER, BRISTOL.

Salary within Class K, Grade 12, Salary Scale 7 (£965 to £1,090 per annum) of the N.J.B. Agreement.

The duties of this post may involve work on operation, maintenance and construction, protection or planning within the Bristol District.

Previous experience of operation, maintenance and construction on underground and overhead systems up to and including 33 kV is desirable. It would be an advantage if candidates have worked in urban areas and carried out switching operations on city networks. The successful candidate may be required to undertake standby duty on a rota basis.

Possession of the Higher National Certificate in Electrical Engineering and the ability to drive a car will be an advantage.

Applications for this post to be made on standard form AE6/ACT, OBTAINABLE BY POSTCARD ONLY from the District Manager, South Western Electricity Board, Electricity House, Colston Avenue, Bristol, 1. Closing date for receipt of completed applications is 14th October, 1961.

2464

MIDDLESEX COUNTY COUNCIL

County Architect's Department

ELECTRICAL ENGINEERING ASSISTANT required. A.P.T. II (£815 to £960 plus London weighting up to £40). Established. Prescribed conditions. Should have practical experience or knowledge of contractors' office procedure to assist in preparation of drawings and specifications or wiring of buildings.

Application forms (s.a.e.) from the County Architect, 1, Queen Anne's Gate Buildings, Dartmouth Street, London, S.W.1, returnable by 13th October. Quote H.423ER.

2437

NORTH WESTERN ELECTRICITY BOARD

Fourth Assistant District Commercial Engineer (Technical Sales and Service) Blackpool District

APPLICANTS should have had experience in the development of electrical heating and other loads. Some experience in electrical contracting will be an advantage.

Salary scale £825/£940 p.a., Grade J.13. N.J.B. conditions.

Applications on forms to be obtained from the Manager, No. 4 Sub-Area, North Western Electricity Board, 40/41, Lune Street, Preston, and returned to him by 9th October, 1961.

2438

Situations Vacant (continued)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

East Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER, LEICESTER POWER STATION (Vacancy No. 216/61).

Applications are invited for the position of Assistant Shift Charge Engineer at the Leicester Power Station, Raw Dykes Road, Leicester.

Applicants should have received a sound technical training and have experience in a modern power station. Preference will be given to candidates who possess a Higher National Certificate or its equivalent.

Salary will be in accordance with Class G, Grade 9 (£965 - £1,090 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 13th October, 1961.

FIRST ASSISTANT STATION CHEMIST, DERBY POWER STATION (Vacancy No. 217/61).

Applications are invited for the position of First Assistant Station Chemist at Derby Power Station, Sowter Road, Derby.

Previous experience in a power station laboratory is essential and candidates should preferably be Associates of the Royal Institute of Chemistry or hold an equivalent qualification. Candidates must be familiar with the methods of sampling and analysis of coal, oil and water and with the interpretation and application of the analytical results. Experience with problems arising from high-pressure, high-temperature operation and of the solution of such problems is desirable.

Salary will be in accordance with Class F, Grade 9 (£890 - £1,015 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 13th October, 1961.

These appointments are pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

O. S. WOODS,
Assistant Regional Director.

2456

CABLE INSTALLATION ENGINEER

WELL-known firm of cable manufacturers invite applications from Electrical Engineers for the supervision of major cable installation work in Scotland.

Applicants must have wide experience in all types of H.T. distribution up to 33 kV.

Please reply stating age, experience and salary required to Box No. 45, Dixons, Hills Place, London, W.1.

2434

ELECTRICAL ENGINEERS

Graduate or Chartered Electrical Engineers Required

aged not less than 30, for Industrial Group Consulting Service based in Birmingham.

Candidates should be well educated and have had three years' practical training with a large electrical manufacturer in workshops and drawing office.

Experience is desired in factory supply, distribution and utilisation, with ability to design schemes, specify and engineer electrical extensions and new factory installations. Supervision of contractors and negotiations with managements within the Group at Managing Director levels.

In particular knowledge of variable speed drives, protection, heat treatment, automatic contactor control gear, H.V. and M.V. switchgear would be desirable advantages.

Initiative, drive and personality are as important as technical attributes, and opportunities to transfer within the Group may occur from time to time.

The Group provides for pension scheme, educational benefits, removal allowance, 3 months' subsistence allowance, car mileage allowance, annual pay reviews.

Applications will be treated in confidence and should be forwarded to:—

The Chief Electrical Engineer

T. I. (GROUP SERVICES) LIMITED

72, Cheston Road, Aston, Birmingham, 7

and should be endorsed "ENGINEERS."

2231

LONDON ELECTRICITY BOARD

Assistant Distribution Engineer

APPLICATIONS are invited for the above position in the Board's Central District at Falcon House, Aldersgate Street, London, E.C.1.

Applicants must have had a thorough theoretical and practical training and should have had comprehensive experience of development, construction and maintenance of L.V. and H.V. distribution systems, together with the associated administrative work and the control of labour. Corporate or Graduate Membership of the Institution of Electrical Engineers, or the equivalent, would be an advantage.

The post is graded under Schedule A of the National Joint Board Agreement as Class J, Grade 7, £1,325 rising to £1,460 per annum, inclusive of London allowance.

Applications stating age, qualifications and experience should be sent to the Manager at the above address within 14 days of the publication date of this notice. Please quote ref. PER/V/3409/R.

2416

CITY OF LIVERPOOL EDUCATION COMMITTEE

North East Liverpool Technical College

APPLICATIONS are invited for the appointment of PRINCIPAL of the above College. Salary £2,050 × £50 to £2,150.

The College, which is completely new, is scheduled to open in September, 1962. It will offer O.N.C. courses in Mechanical Engineering, Electrical Engineering, Building, Paint Technology and Rubber Technology. The average daily attendance is expected to be about 600 students.

Applicants should have a graduate qualification in engineering or science and should have held a position of responsibility in an establishment of Further Education. Duties will commence on 1st January, 1962, or as soon after that date as possible.

Further particulars and application forms (returnable by 11th October, 1961) from the Director of Education, 14, Sir Thomas Street, Liverpool, 1.

THOMAS ALKER,
Town Clerk.

(J.6982) 218

COUNTY OF LANARK

Chief Technical Assistant (Lighting)

APPLICATIONS are invited for the post of CHIEF TECHNICAL ASSISTANT in the Lighting Section of the County Surveyor's Department at Hamilton on the salary scale £850/£1,150, with placing according to qualifications and experience. Applicants should be Corporate Members of the Association of Public Lighting Engineers or the Institution of Electrical Engineers, and should have extensive knowledge of the design, erection and maintenance of public lighting installations.

Superannuation scheme in operation and 5-day week. Medical examination.

Applications stating age, qualifications and experience, with the names and addresses of three referees, to be lodged with undersigned not later than 11th October, 1961.

IAN V. PATERSON,
County Clerk.

P.O. Box No. 1,
Glasgow.

2436

GEORGE E. TAYLOR

(LONDON) LIMITED

ELECTRICAL/MECHANICAL ENGINEERING CONTRACTORS

Member of the TURRIFF GROUP

EXPANDING interests provide for the following appointments to the staff of the Electrical Department:—

PLANNING ENGINEER.
ESTIMATING ENGINEER.
TECHNICAL CLERK.

We are looking for men of initiative and enterprise who in turn are seeking permanent and progressive appointments with attractive salary. Pension/bonus scheme. Modern office. Cafeteria on premises. 5-day week.

Please write or call:—

Group Personnel Manager
Turriff Building, Great West Road
Brentford, Middx.

2428

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following positions :—

Swansea and West Central Area

(a) GENERAL ASSISTANT ENGINEER, PORT TALBOT DISTRICT (ref. 84/61/ER) (Re-advertised). The duties of this position will be of a general nature and preference will be given to engineers possssing Higher National Certificate in Electrical Engineering.

Salary N.J.B. Class H, Grade 11, Scale 6 (£890/£1,015 per annum).

(b) COMMERCIAL ASSISTANT, NEATH DISTRICT (ref. 116/61/ER). Preference will be given to engineers possessing Higher National Certificate in Electrical Engineering.

Salary N.J.B. Class F, Grade 9, Scale 6 (£890/£1,015 per annum).

Applications stating age, present position, present salary, qualifications, experience, and endorsing envelope with the appropriate reference, should be addressed to G. R. T. Edwards, B.Sc., M.I.E.E., M.Am.I.E.E., Manager, Swansea and West Central Area, 29, Ystrad Road, Fforestfach, Swansea, to arrive not later than 14th October, 1961.

R. G. WILLIAMS,
Secretary.

2446

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER is required at Stourport "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade K.8, £1,275-£1,410 per annum, plus 10% for shift duties.

Applicants should have received a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear, and a knowledge of P.F. firing is desirable. Appropriate technical qualifications would be an advantage.

Previous applicants will be considered and need not re-apply.

Apply, quoting Vacancy No. 249/61 MD, on form AE6, available from the Station Superintendent, Stourport Power Station, Severn Side, Stourport-on-Severn, Worcs., by 9th October, 1961.

2425

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

SECOND ASSISTANT ENGINEER, ELECTRICAL DEPARTMENT, GENERATION HOUSE
(Vacancy No. 61/580).

Applications are invited for the above superannuable post which is vacant in the London North Section. Applicants should preferably be Corporate Members of the I.E.E. or hold equivalent qualifications, and should have had considerable experience in the administration of a large high-voltage transmission section, and must produce evidence of ability in management matters and staff control.

Salary and conditions of service in accordance with the N.J.B. Agreement, Schedule A, Class K (Division), Grade 5 = £1,475 - £1,780 per annum, inclusive of London allowance.

THIRD ASSISTANT ENGINEER, ELECTRICAL DEPARTMENT, GENERATION HOUSE
(Vacancy No. 61/581).

Applications are invited for the above superannuable post which is vacant in the London North Section. Applicants should preferably be Corporate Members of the I.E.E. or hold equivalent qualifications, and should have had considerable experience in the operation and maintenance of high-voltage overhead lines and cables, switchgear (oil-filled and air-blast) and transformers. They must also have had considerable experience in the operation of the Board's safety rules and in the control of both technical and manual staff, and be familiar with the Board's negotiating machinery.

Salary and conditions of service in accordance with the N.J.B. Agreement, Schedule A, Class K (Division), Grade 6 = £1,380 - £1,670 per annum, inclusive of London allowance.

Applications, quoting vacancy number, may be made (on the standard form obtained locally) and sent to the Personnel Department, Central Electricity Generating Board, P.O. Box No. 136, London, W.1, not later than 10th October, 1961.

2423

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with the N.J.B. Agreement, Schedule A. Salary includes London allowance.

ASSISTANT ENGINEER (Drawing Office), BELVEDERE POWER STATION
(Vacancy No. 61/577).

Minimum technical qualification O.N.C. level, general drawing office duty in large modern power station.

Salary Class L, Grade 13 = £1,015-£1,140 per annum.

ASSISTANT SHIFT CHARGE ENGINEER, BLACKWALL POINT POWER STATION
(Vacancy No. 61/578).

Sound technical training necessary with practical experience in operation of modern power station, preferably with pulverised fuel firing. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

Salary Class G, Grade 9 = £1,015-£1,140 plus £96 10s. to £109 shift per annum.

ASSISTANT ENGINEER (Efficiency and Test), FULHAM POWER STATION
(Vacancy No. 61/579).

Applicants should have received a sound technical training, preferably in mechanical engineering, and should have some experience in modern power station practice. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

Salary Class K, Grade 15 = £815 - £920 per annum.

Applications, quoting vacancy number, may be made (on the standard form obtained locally) and sent to the Personnel Department, Central Electricity Generating Board, P.O. Box No. 136, London, W.1, not later than 10th October, 1961.

2422

BRANCH MANAGER

working from office in Birmingham. Preference will be given to a young electrical engineer with experience of electric motors and associated control gear. Experience in technical and commercial sales is required with the ability to accept the responsibility of running a small Office.

Company car provided. Contributory pension scheme after qualifying period.

Applications giving full details of age, experience, qualifications and present salary to:

Personnel Manager, Fuller Electric Limited

Fulbourne Road, Walthamstow, London, E.17

2435

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD

40, Eastbourne Terrace, London, W.2

Regional Engineer's Department

PRINCIPAL ASSISTANT ENGINEERS (Electrical/Mechanical/Heating and Ventilating) required to control work of a substantial staff engaged on hospital development, including the planning and erection of new hospitals.

Applicants must be Corporate Members of the Institutions of Electrical or Mechanical Engineers, unless professionally graded in the National Health Service, and must possess experience in a senior capacity in the design of electrical services, boiler plant, steam, heating, hot water and ventilation systems.

SALARY £1,715 rising to £2,085, inclusive.

LEAVE: 25 days rising to 30 days. Posts permanent and pensionable.

Application forms obtainable from the Secretary, North East Metropolitan Regional Hospital Board, 40, Eastbourne Terrace, London, W.2, must be returned by 16th October, 1961.

2465

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

MAIN GRADE ENGINEER (Electrical) required. Applicants should be A.M.I.E.E. but graduate members will be considered provided they have passed the Institution Examination of the Institution of Electrical Engineers.

The post is permanent and superannuable. The Board operates a scheme of financial assistance for those studying for approved professional qualifications.

Salaries will be within the range of £950 to £1,650. It is possible for corporate members to enter at a salary point up to a maximum of £1,350 and graduate members at a point up to a maximum of £1,255, in respect of years of relevant experience since completing the appropriate Institution's examination.

Apply stating age, qualifications (with dates) and experience, with names of two referees, to the Secretary, North West Metropolitan Regional Hospital Board, 40, Eastbourne Terrace, London, W.2, quoting reference 983, by 24th October.

2466

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DRAUGHTSMAN (Architectural) required in the Engineering Department at the Headquarters of the Board, Electricity House, Love Lane, Liverpool, 3.

Applicants should be 21 years of age or over, have served a building apprenticeship or received architectural training, and have obtained the O.N.C. (Building) or equivalent. Experience in the preparation of building construction drawings would be an advantage but is not essential.

The salary payable will be within the range £760/£940 per annum (N.J.B. Class J, Grade 13).

Appointment subject to medical examination. Pension scheme.

Applications, by letter to the Establishments Officer at the above address, should be received not later than 9th October, 1961.

2447

Situations Vacant (continued)

Eastern Electricity

Fens Sub-Area

THIRD ASSISTANT ENGINEER (Construction) (201/61.N). This appointment is based at the Construction Unit, St. Neots. A sound technical training to Grad. I.E.E. standard is desirable, together with some experience of construction work in a predominantly rural area.

The work involves the supervision of the construction of 33-kV, 11-kV and L.V. overhead lines and associated equipment. The position offers an excellent opportunity for obtaining experience in other aspects of construction work in a Sub-Area where construction is centralised.

Salary N.J.B. Class K, Grade II (£1,040-£1,165 per annum).

Apply by letter to the Manager, Fens Sub-Area, Eastern Electricity Board, Milton Hall, Milton, Cambridge, by 13th October, 1961.

2445

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

Littlebrook Power Station

ASSISTANT ENGINEER (Efficiency) (Vacancy No. 59a/61). Candidates should possess technical qualifications to at least H.N.C. standard and practical experience in generating station work would be an advantage. The successful applicant will be required to assist the Station Efficiency Engineer in investigations into the thermal performance of the plant, and will be required to work independently and to take the initiative in solving problems which arise.

Salary N.J.B. L.11, £1,165-£1,295 per annum, including London allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Littlebrook Power Station, near Dartford, Kent, to arrive by 11th October.

2461

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER is required at Meaford "B" Power Station, near Stone, Staffs. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade K.8, £1,275-£1,410 per annum, plus 10% for shift duties.

Applicants should have received a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear, and a knowledge of P.F. firing is desirable. Appropriate technical qualifications would be an advantage.

Apply, quoting Vacancy No. 251/61MD, on form AE6, available from the Station Superintendent, Meaford Power Station, near Stone, Staffs., by 9th October, 1961.

2426

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Application in writing to :—

Chief Electrical Engineer
LANCASHIRE STEEL MANUFACTURING CO. LTD.
Irlam Works, Irlam, Manchester

2440

TECHNICAL ASSISTANT

required for Electrical Section of Chief Engineer's Department.

Experience of preparation of specifications and site supervision of modern industrial and commercial installations an advantage. Graduate or associate membership of professional body desirable. Superannuation scheme; yearly review of salary.

Apply giving details of age and qualifications to :—

UNITED DAIRIES LIMITED
Empire House, Hanger Green
London, W.5

2463

APPLICATIONS are invited by Kennedy & Donkin, 12, Caxton Street, London, S.W.1 (ref. RFL), for the post of assistant in the cable department at their Weybridge office. Applicants must be qualified electrical engineers with experience in design, manufacture and installation of cables for transmission and generation projects. 341

CABLE engineer required for the Midlands area capable of supervising cable laying and jointing contracts. An excellent opportunity for a man wishing to take charge of an area and work with a considerable amount of freedom. Pension scheme and car provided. Reply stating age, salary and experience.—Box 2407.

COMMERCIAL sales engineer required by merchant company operating in the Far East, for service in the Federation of Malaya. Minimum qualification O.N.C. (either elec. or mech.); age about 25. Good salary, scale according to qualifications and experience; excellent prospects. Annual increments; provident fund; non-contributory pension scheme; free furnished accommodation; passage provided. Write — Box No. 2057, c/o Abbotts, Eastcheap, London, E.C.3. 2468

CONSULTING engineers require designer/draughtsmen experienced in the design of electrical services for Government projects, hospitals, schools, etc. Excellent promotion prospects in expanding practice. Write—Locke & Beal, 303/307, Balham High Road, London, S.W.17. 2405

CONTRACTORS, senior and assistant engineers required by well-established firm, central London, for quality work of all types. Positions offer scope for advancement for capable and energetic engineers. Write fullest detail, in confidence, of experience, training, age and salary required.—Box 133.

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ELECTRICAL cable makers require experienced representative for Midlands area. Salary plus commission give immediate earnings of £1,400 per annum with ample scope for improvement. Successful applicant would also be required to take control of branch premises in Wolverhampton. Some experience of radio and television industry would be an added advantage. Car provided. Pension scheme. Apply in strict confidence to Sales Director, Permanoid Limited, Manchester, 4. 2368

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ELECTRICAL firm with attractive retail showrooms and small contracting business of good standing requires capable practical man with high standards of service to take charge of dept. N.W. London. Able to drive. Good position and prospects for keen man. State age and details of career.—Box 8344.

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EXPERIENCED servicing engineer required by a medium-sized engineering co. in N.W. London to service and maintain electric vehicles (including I.T.D. and conveyancer fork-lift trucks). Good wages, canteen, pension scheme. Apply to the Employment Officer, E.N.V. Engineering Co. Ltd., Hythe Road, Willesden, London, N.W.10. 2411

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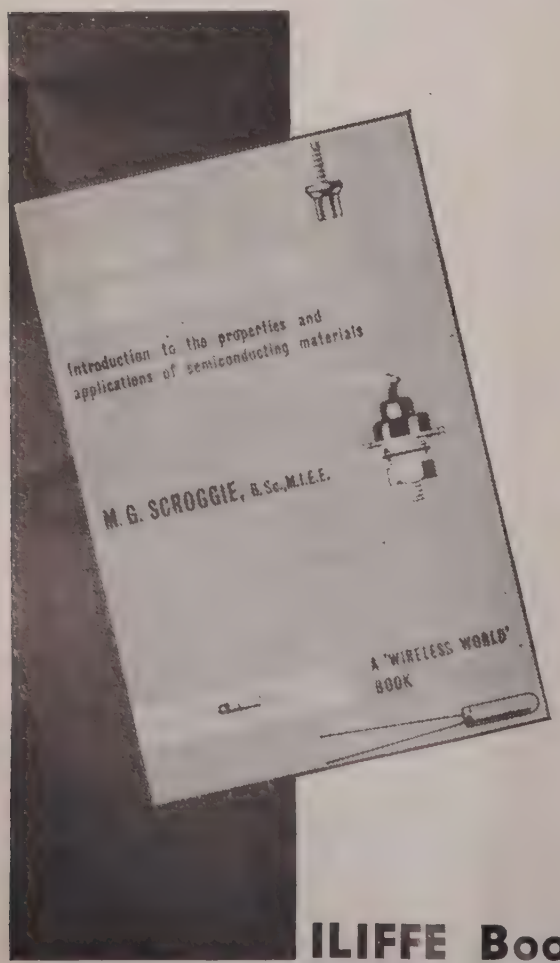
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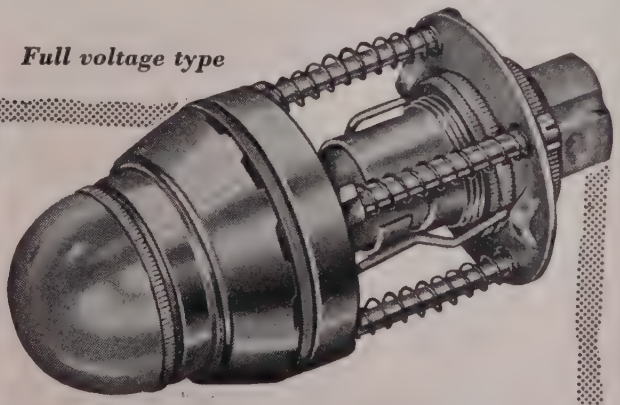
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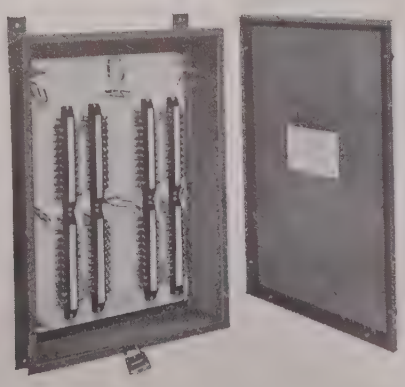
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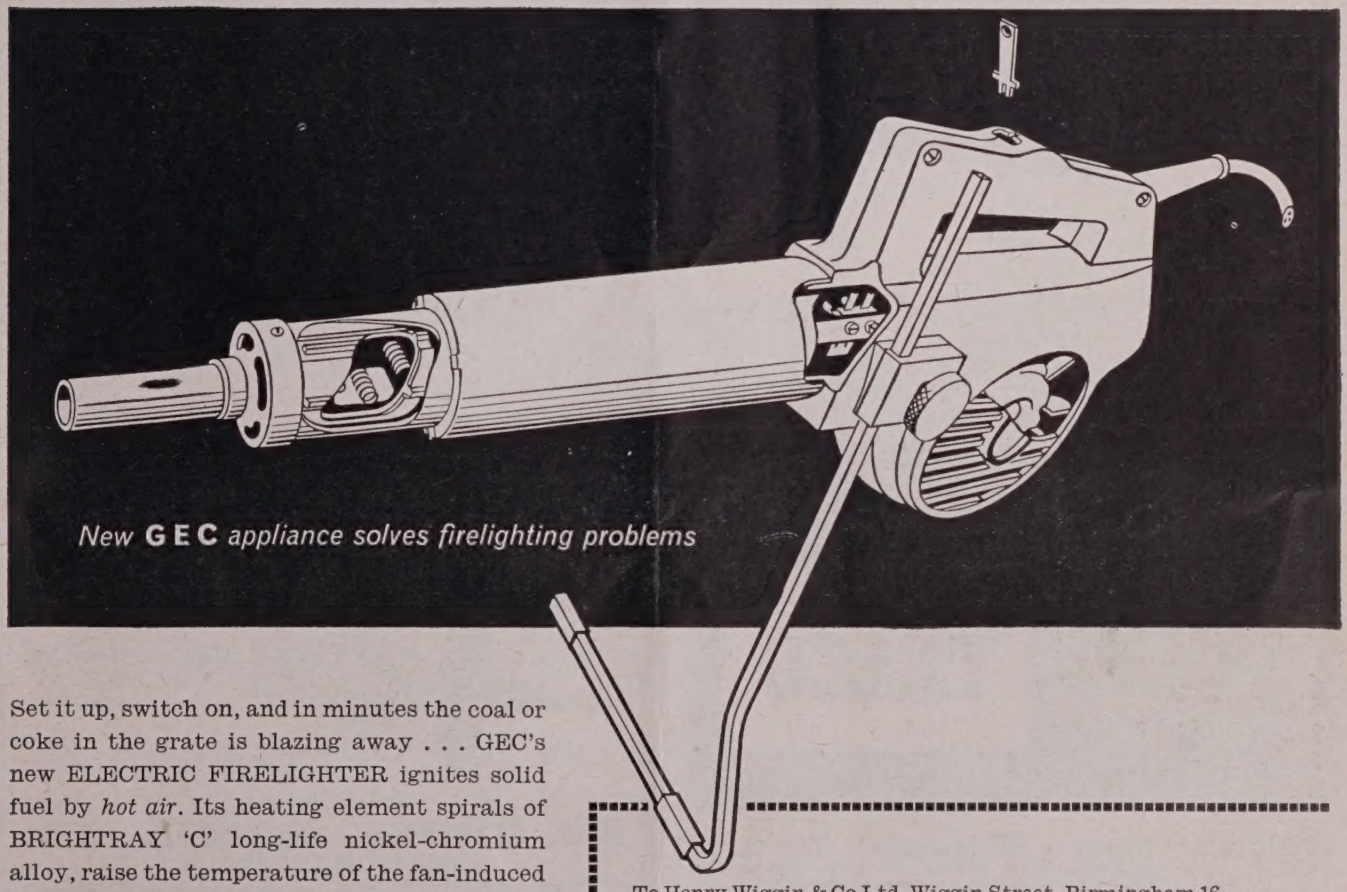
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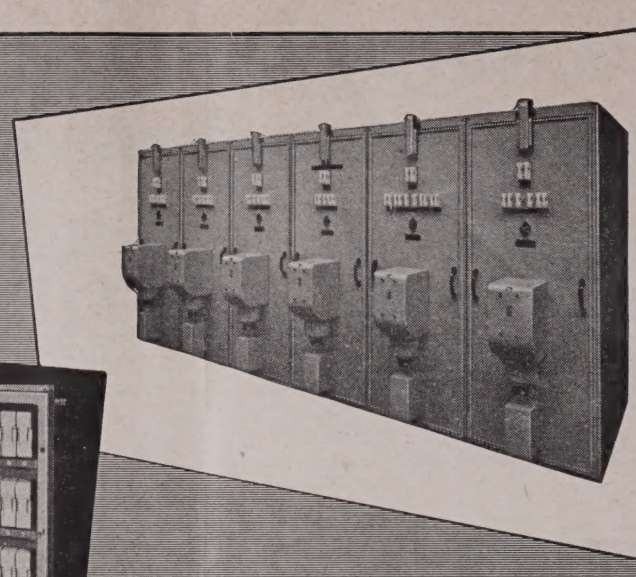
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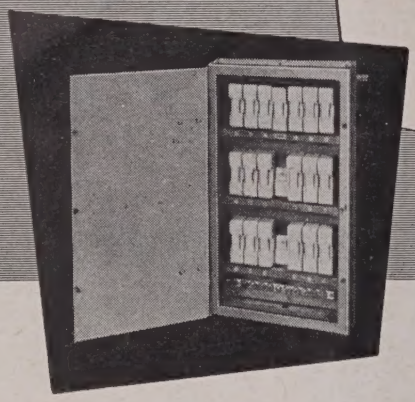
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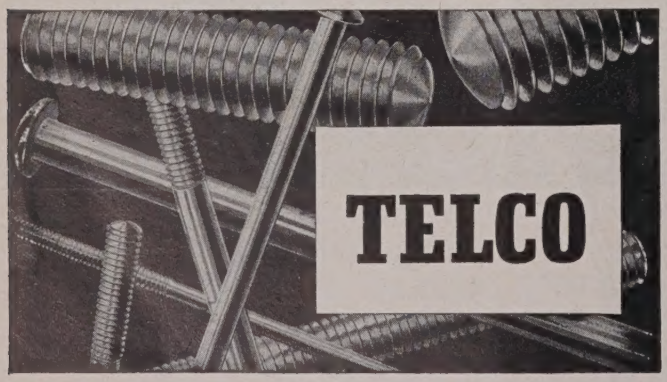
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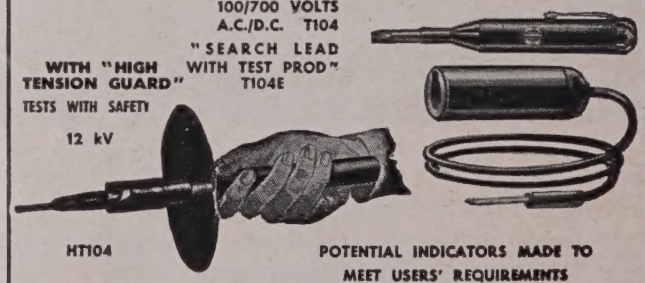
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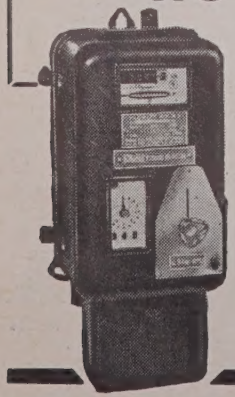
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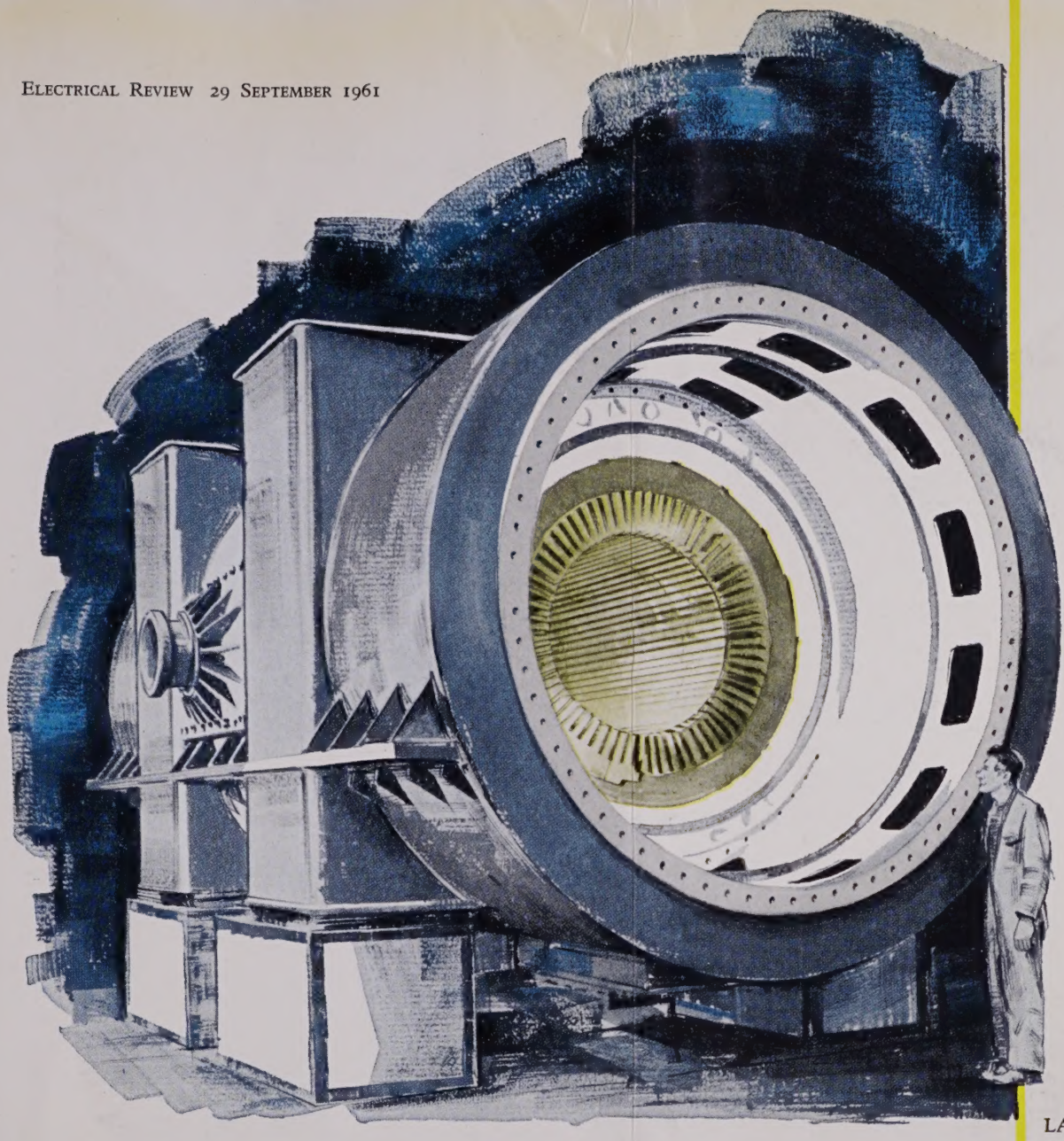
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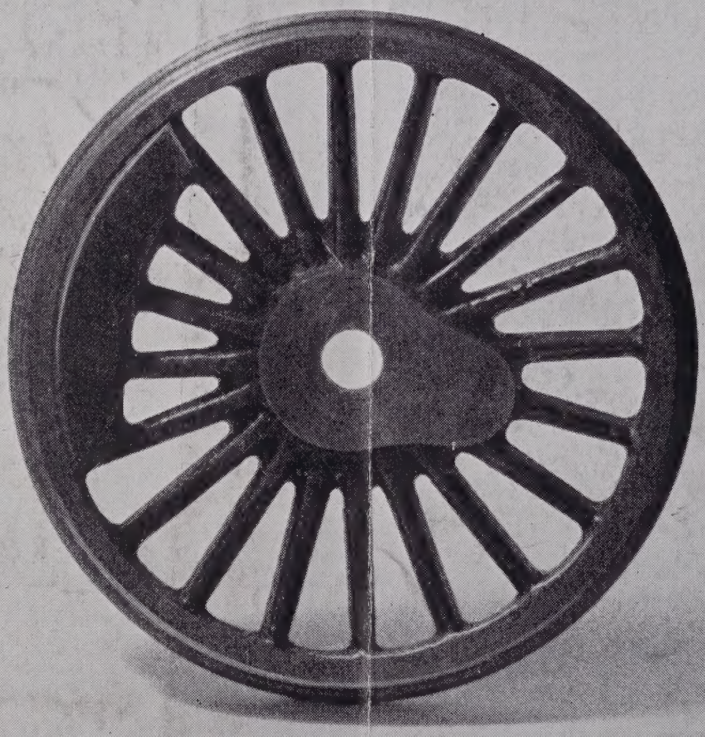
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